NBA VBA WRCC CICOS OMVS

REPORT ON EXPERIENCES OF TRANSBOUNDARY BASIN ORGANIZATIONS IN AFRICA

Good practices and recommendations

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International Office for Water

AGENCE FRANÇAISE DÉVELOPPEMENT

ANBO

CONTENTS

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Referring to the bibliographic appendix, the references mentioned in the report are coded as follows:

organization / *theme*	**NBA**	**VBA**	**WRCC**	**CICOS**	**OMVS**	**others**
Monitoring	MN	MV	MO	MC	MS	MA
Governance	GN	GV	GO	GC	GS	GA
Planning	PN	PV	PO	PC	PS	PA
Financing	FN	FV	FO	FC	FS	FA

List of abbreviations and acronyms

Acronym	*Meaning*
ABN / NBA	Niger Basin Authority
ABV / VBA	Volta Basin Authority
ACMAD	African Center of Meteorological Application for Development
ADC / JDA	Joint Development Agreement
AFD	French Development Agency
AMESD	African Monitoring of the Environment for Sustainable Development
BAD/AfDB	African Development Bank
CBLT/LCBC	Lake Chad Basin Commission
CCRE / WRCC	ECOWAS Water Resources Coordination Center
CE / EC	European Commission
CEDEAO / ECOWAS	Economic Community of West African States
CEEAC / ECCAS	Economic Community of Central African States
CEE-ONU / UNECE	UN Economic Commission for Europe
CEMAC	Economic and Monetary Community of Central Africa
CICOS	International Commission of the Congo-Ubangi-Sangha Basin

CILSS	Permanent Interstate Committee for Drought Control in the Sahel.
COBAT	Coordination of Transboundary Basins
CPCS / PFCM	Permanent Forum for Coordination and Monitoring
EIES / ESIA	Environmental and Social Impact Assessment
FAE / AWF	African Water Facility
FEM / GEF	Global Environment Facility
FFEM	French Global Environment Facility
GIEC / IPCC	Intergovernmental Panel on Climate Change
GIRE / IWRM	Integrated Water Resources Management
GSM	"Global System for Mobile Communications"
GWP	Global Water Partnership
IRD	Institut de Recherche pour le Développement (France) / French Research and Development Institute
2iE	Institut International d'Ingénierie de l'Eau et de l'Environnement / International Institute for Water and Environmental Engineering
KPI	"Key Performance Indicators"
MRC	Mekong River Commission
NEPAD	Nouveau Partenariat pour le Développement de l'Afrique / The New Partnership for Africa's Development
OBT / TBO	Transboundary Basin Organization
OIEau / IOWater	International Office for Water
OMM / WMO	World Meteorological Organization
OMVG	Organisation pour la Mise en Valeur du fleuve Gambie / Organization for the Development of the Gambia River
OMVS	Organisation pour la Mise en Valeur du fleuve Sénégal / Organization for the Development of the Senegal River
PADD / APSD	Action Plan for Sustainable Development
PASIE / EMMP	Environmental Mitigation and Monitoring Plan
DCP	Data collection platform
PIDA	Program for Infrastructure Development in Africa
RAOB / ANBO	African Network of Basin Organizations
RIOB / INBO	International Network of Basin Organizations
RIOBT / TINBO	Network of International Commissions and Transboundary Basin Organizations
SADIEau / AWIS	African Water Information and documentation System
SAGE	Water Development and Management Plan
SDAGE	Master Plan for Water Development and Management
SGPF	Company for the Management of St. Louis seaport, ore docks and the River navigation channel
SIBCO	Congo Basin Information System
SIG / GIS	Geographic Information System
SIP	Computerized forecasting system
SOGED	Company for the Management and Operation of Diama Dam
SOGEM	Company for the Management of Manantali Hydropower
SOGENAV	Company for the Management and Operation of Navigation on the Senegal River
UA / AU	African Union
UEMOA	West African Economic and Monetary Union
UICN / IUCN	International Union for Conservation of Nature
UNECE	UN Economic Commission for Europe s
UNESCO	United Nations Educational, Scientific and Cultural Organization
WAPP	West African Power Pool
WWF	World Wide Fund for Nature

1. Introduction

1.1 General

Transboundary Integrated Water Resources Management (IWRM), which involves appropriate governance and planned investments on basin scale, is the key for a sustainable use and conservation of natural resources. By fairly sharing out the resources and benefits involved, it helps to prevent conflicts between uses and nations and thus contributes to sustainable development in the areas considered.

Transboundary basin organizations are the most suitable framework for water resources management beyond national borders. Organizations of this type have existed for several decades on the Senegal (OMVS) and Niger (NBA) River Basins, and more recently on the Mekong (MRC), Congo (CICOS) and Volta (VBA) rivers. These basin organizations accomplish various functions and have different administrative and legal forms, determined by the basin's context and history as well as by the mandate given to the structure established by basin organization's Member States.

A water resources coordination unit, currently called the Water Resources Coordination Center (WRCC), was established within the Economic Community of West African States (ECOWAS) in 2004 partly to promote river basin management.

The French cooperation supports these institutions through various projects and technical assistants specialized in IWRM.

1.1.1 *Organizations involved*

The Niger Basin Authority (NBA) was established on 21 November 1980 in Faranah (Guinea) by the nine states sharing the Niger basin (Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger and Nigeria). Its mandate is to promote cooperation between member countries and ensure integrated development of the Niger Basin in the fields of water, energy, agriculture, breeding, fisheries and fish farming, forestry and logging, mining, industry, transport and communications. Its head office is located in Niamey, Republic of Niger.

The Niger Basin Authority led to a Shared Vision process marked in particular by the adoption in 2008 of an Action Plan for Sustainable Development (APSD), with an investment program for 2027 and the ratification of a Water Charter for the basin which has entered in force in the 19th of July 2010 with deposit of the ratification documents with the African Union and the United Nations. A major challenge for the NBA is to accelerate and support the construction and coordinated management of large hydraulic structures in the Niger River Basin, and establish the conditions for sustainable development of regulated water. NBA has, among other skills, solid experience in collaborative planning, monitoring and hydrological modelling.

The Volta Basin Authority (VBA) was established in 2007 by six African States (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo) with a mandate to:

1. Promote continuous dialogue;
2. Promote IWRM and fair sharing of benefits;
3. Authorize the establishment of infrastructure and the implementation of projects likely to have significant impacts;
4. Develop and implement joint projects and common structures;
5. Contribute to poverty mitigation, sustainable development and better socio-economic integration.

In 2009, the Council of Ministers in charge of water resources in the six VBA member countries adopted the Authority's Strategic Plan 2010-2014 and started drafting the Basin Water Charter.

The Organization for the Development of the Senegal River (OMVS) was established in 1972. This international institution is registered with the United Nations and has its

headquarters located in Dakar (Senegal). It unites Guinea Conakry, Mali, Mauritania and Senegal around common goals, including food self-sufficiency for basin populations, economic development of Member States, and conservation of the ecosystem balance in the sub-region. OMVS possesses its own Water Charter and a rare degree of sovereignty in relation to large dams: any structure in the basin is the common and indivisible property of the Member States. It also has an suitable internal funding mechanism. OMVS has developed a Master Plan for Water Development and Management (SDAGE) through a participatory process.

For many years, West Africa has been involved in a regional IWRM process. Through one of its strategic field of intervention for the 2007-2015 period focusing on governance of transboundary waters, the **Water Resources Coordination Center** (WRCC) of the Economic Community of West African States (ECOWAS) is striving to "provide support to transboundary basins and facilitate IWRM processes in the basins" and to "advance regional integration of the water sector". For this purpose, WRCC has developed a regional framework and integration tools to enable countries and basins to faster implement IWRM in a more concerted manner. WRCC has adopted a benchmarking approach (Performance Indicators) and is leading discussions on large water structure projects in West Africa.

The International Commission of the Congo - Ubangi - Sangha Basin (CICOS), established in 1999, expanded its mission to IWRM in 2007, in addition to its original mandate focusing on the promotion of inland navigation, i.e. procedure for water use, review and approval of new projects, environmental protection and user participation. CICOS Member States (Cameroon, Central African Republic, Congo, Gabon, and Democratic Republic of Congo) cover around 83% of the Congo River Basin, with a surface area of 3,822,000 km². CICOS possesses an original, self-financing mechanism called the Community Integration Tax of the Economic and Monetary Community of Central Africa (CEMAC).

Each of these structures has acquired general experience that is potentially beneficial to other institutions undergoing a process of capitalization and development. The structures also all actively participated in the "Key Performance Indicators" project jointly financed by France and the ACP-EU Water Facility and implemented by the African Network of Basin Organizations (ANBO) and IOWater, which produced very interesting results, including using the indicators developed to measure the quality of IWRM implementation.

1.1.2 *Implementation Partners*

As a public institution, the **French Development Agency** (AFD) has been fighting against poverty and promoting development for seventy years. It implements the policy defined by the French Government. AFD finances and supports projects that improve people's living conditions, promote economic growth, and protect the planet. Accompanied by the French Global Environment Facility (FFEM), AFD supports the six above-mentioned institutions in their efforts to apply transboundary water management.

The African Network of Basin Organizations (ANBO) was established in 2002 and aims to strengthen links between its members and with other basin organizations; organize joint activities of national, regional and continental interest based on IWRM principles; and fosters the emergence and development of basin management bodies in Africa. The ANBO permanent secretariat is ensured by OMVS and its West and Central Africa sub-components are respectively chaired by NBA and CICOS.

The International Network of Basin Organizations (INBO), which has several regional variations including ANBO, was established in 1994 to promote IWRM and the creation and strengthening of basin organizations worldwide. The INBO permanent secretariat has been provided by the International Office for Water since its inception. The Network of International Commissions and Transboundary Basin Organizations (TINBO), established in 2002, is also worth a mention.

The International Office for Water (IOWater) has developed international know-how on building stakeholder capacity in the water sector, both at national and other levels. Various tools have been used to date:

- Training on IWRM in workshops and seminars, organization of specialized tours and courses;
- Studies related to capacity building (audits and training plans);
- Design and installation of water training centers, set-up and running of the International Network of Water Training Centers;
- Organizational and technical support to set up water information systems (at national and transboundary basin levels) that make it easier to produce data and share useful information for decision-making.

1.2 Objectives

French cooperation activities to support Transboundary Basin Organizations have made a move forward to develop more comprehensive and cross-cutting action, involving sharing experiences and building capacities. The aim is to improve the efficiency of beneficiary institutions (NBA, VBA, WRCC, CICOS, OMVS) in their IWRM activities per basin, in addition to the technical assistance provided.

The specific objectives are the following:

- For institutions, to capitalize on the relevant experiences of other institutions and take on best practices;
- To support and coordinate the technical assistance to the institutions;
- To improve beneficiary institutions' strategic vision of their activities;
- To organize benchmarking, especially on the following topics:
  a. Governance;
  b. Looking for self- and sustainable financing;
  c. Strategic planning and implementation of actions;
  d. Optimization of monitoring;
- Exchange of best practices at the regional and global levels, including through the ANBO, INBO and TINBO networks.

An overview of experiences and good practices on these four themes has been produced and is the object of this document.

The theoretical basis of this document already exist in the 2009 INBO-GWP handbook on IWRM in basins, the methodological guide on joint management of transboundary aquifers (AFD-IOWater-Water Academy-BRGM-UNESCO, 2010), and the handbook on IWRM in transboundary rivers, lakes and aquifer basins (INBO-GWP-UNECE-UNESCO-GEF-AFD, 2012). This guide, however, aims to be more illustrative and practical.

This document gives organizations an opportunity to deliver their experience and know-how and learn from the success of other organizations. They may use it to adjust their activities and integrate the lessons learned in their reporting to decision-making bodies.

The aim is that this document should be regularly reviewed and updated to include relevant new experiences.

1.3 Methodology

The overview of experiences was produced based on bibliographic data and consultations with basin organizations and partners during various missions, especially in Ouagadougou and Kinshasa.

A web portal for sharing documents (COBAT: coordination of transboundary basins) was set up to allow all partners to share working papers and summaries or any interesting documents. Access to this portal has so far been restricted to the project partners but will later be opened and shared with the public through AWIS (African Water Information System), managed by ANBO.

A bibliography on the four themes studied is provided in the appendix, and full documents are available on the portal. Apart from general points, all practices (good or bad) presented in this document are taken from these references.

Other references (bibliography, websites) are available on the website: www.sadieau.org.

A meeting was held with all partners during the 6th World Water Forum in Marseilles in March 2012. A restricted meeting (AFD, IOWater, OMVS, WRCC) also took place in Stockholm in August 2012 at the World Water Week.

An electronic forum on monitoring was organized in September 2012 involving 145 participants. Ten messages per week were recorded during the three-week forum. A summary was produced and is attached hereto.

1.4 Presentation of the river basins

This chapter briefly presents the characteristics of the river basins concerned. Fact sheets presenting these basins and basin organizations are available in the appendix.

The Niger River Basin

The Niger River is nearly 4,200 km long (third longest river in Africa, 9th longest in the world). Its catchment area covers about 1,500,000 km^2, with significant natural resources that have so far been little exploited but which are gradually decreasing. The Niger catchment area is shared by nine countries: Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger and Nigeria, which together established the NBA on the 21st of November 1980. The basin population was estimated at over 130 million inhabitants in 2012 with an annual growth rate of about 3%.

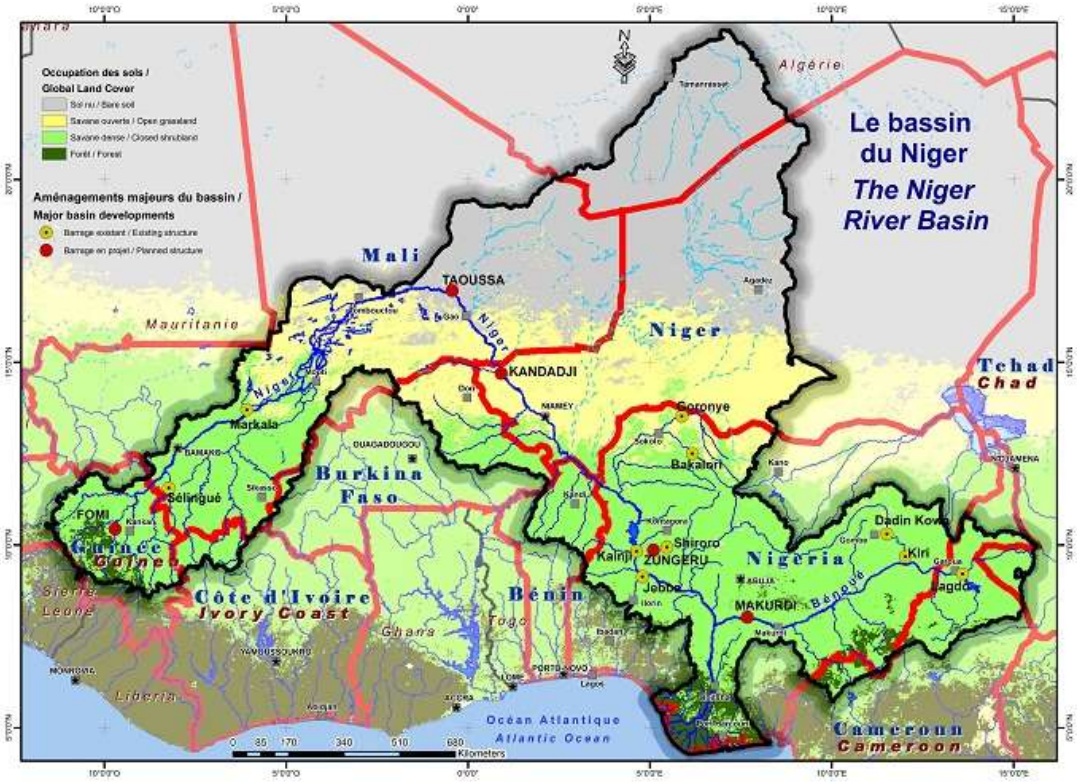

Figure 1: The Niger River Basin

The Volta River Basin

The Volta River is 1,850 km long with a basin surface area of 400,000 km^2, which includes six countries in West Africa: Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo. 85% of the basin's total area is shared between Ghana and Burkina Faso. With reserves of over 60 billion m^3, the Akosombo Dam in Ghana is a major structure. Over 18 million people live on the river basin.

Figure 2: the Volta River Basin

The Economic Community of West African States (ECOWAS)

ECOWAS is composed of 15 states in the western region of Africa: Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. Around 230 million people live in the area, which is estimated at more than five million km^2. The major river basins in this sub-region are the Niger, Senegal and Volta river basins and the Lake Chad basin (which also occupies part of Central Africa).

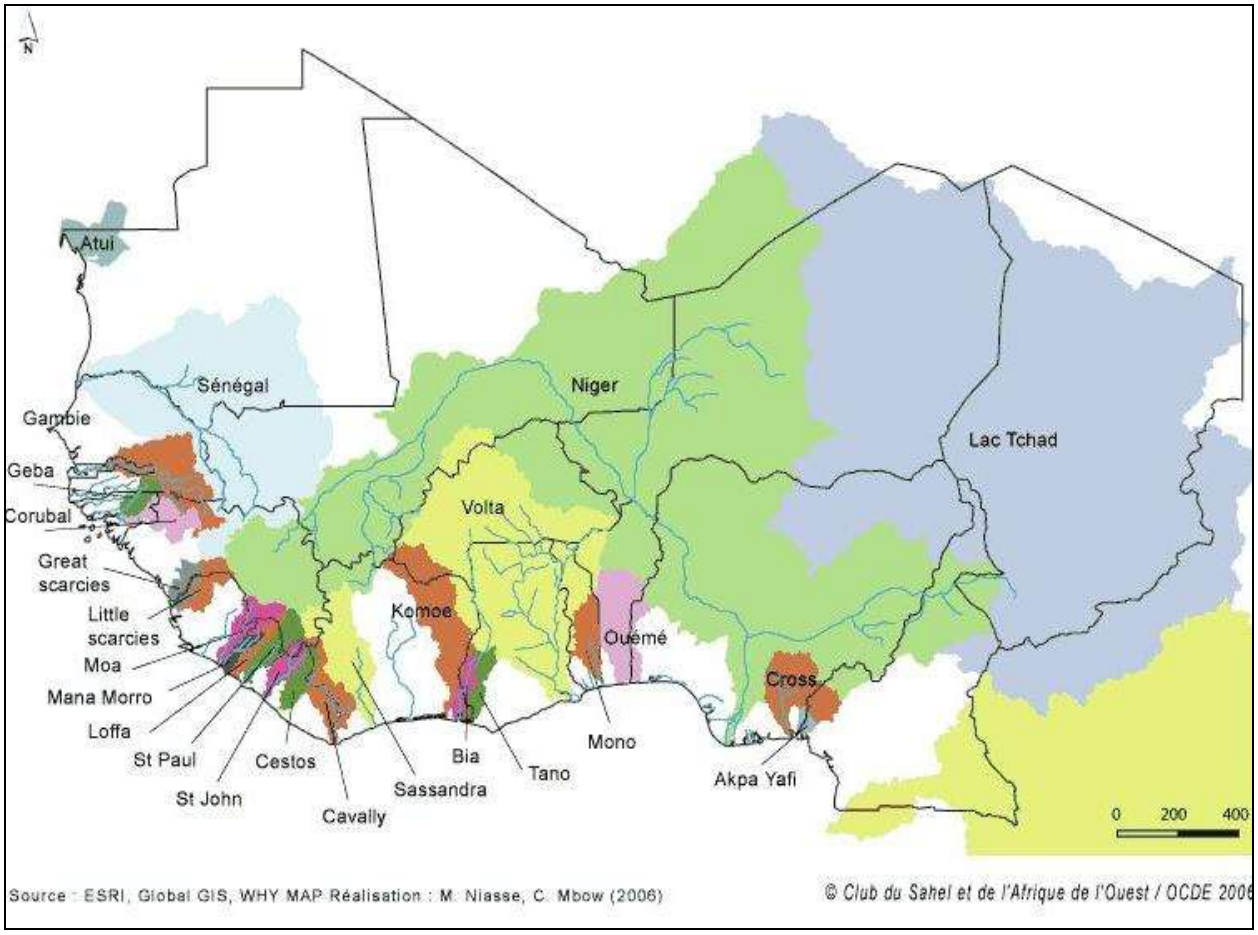

Figure 3: the Economic Community of West African States (ECOWAS) and its river basins

The Congo River Basin

The Congo River Basin, at 4,700 km, is the longest river in Africa and the second largest in the world in terms of surface area (3.8 million km²) and flow rate (41 000 m^3/s in Kinshasa/Brazzaville). It covers 10 countries in Central Africa: Angola, Burundi, Cameroon, Central African Republic, Congo, Gabon, the Democratic Republic of Congo, Rwanda, Tanzania and Zambia. The main tributaries of the Congo are the Ubangi, Sangha and Kasai. More than 90 million people live within the river basin boundaries.

Figure 4: the Congo River Basin

The Senegal River Basin

The Senegal River is 1,800 km long and its basin covers a surface area of about 300,000 km^2 shared by Guinea, Mali, Mauritania and Senegal. About 3.5 million people live in this basin, with approximately 85% of them near watercourses. The Diama and Manantali dams partly satisfy electricity needs of the four riparian countries and cover the demands of significant agricultural production.

Figure 5: the Senegal River Basin

NBA VBA WRCC CICOS OMVS

GOVERNANCE

Good practices and recommendations

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2. Governance

2.1 General information on governance

The challenge of **integrated water resources management** is to achieve a balance between water usages, which is crucial to the subsistence of a growing global population. Indeed, this population needs water to be protected and conserved to ensure its sustainability. Governance systems define methods for water resources management and sharing. The increasing competition for freshwater resources round the world requires models for improved governance to ensure sustainable management.

Water governance is defined as the combination of political, social, economic and administrative systems that more or less directly affect the uses, development and management of resources, and the provision of services to inhabitants. It involves formulating and implementing water policies and appropriate institutional and legal frameworks. It also helps clarify individual roles and responsibilities in terms of the ownership, use, management and planning of resources and structures. "Good" governance is based on the principles of equal access to resources and services, efficiency, basin management, but also integrated approaches and balance in terms of developing socio-economic activities, and the needs of the natural environment.

Several levels of governance interact, i.e. national level in the form of the government, representatives from civil society and the private sector; and "local" levels in the form of local governments, often with different dimensions (municipality, district, department, small region). The traditional approach, which tends to be sectoral and fragmented, often pushes governing bodies to represent conflicting interests and define policy objectives, sometimes without any consultation, and without taking into account the implications for all water users and/or institutions. The use of financial and physical resources resulting from this approach is not aimed at the benefit of a society as a whole, and is sometimes to the detriment of natural environments and ecosystems.

Better governance involves promoting dialogue and establishing partnerships between different levels. It means coordinating policy development, planning and implementation. It becomes more complex when it involves managing resources shared by several countries. Transboundary river basins account for 60% of surface water flows and host 40% of the world's population; more than 2 billion people depend on shared aquifers. In some cases, the main supply comes from resources located outside the country, which therefore means water resources must be shared between the interested parties, (usually two countries, but the number of States involved can reach as many as 19 countries in the case of the Danube River basin).

Transboundary basins are specific in terms of governance because within their perimeters:

- Water management responds to different political, legal and institutional frameworks, illustrating riparian states' sovereignty over their water management area;
- The interests and objectives of using water resources are different depending on the upstream or downstream location of the countries, and remain highly dependent on the degree of integration of the management policies of each country;
- A country's involvement in transboundary cooperation is often related to the size of its territory or economy with respect to the transboundary resource;
- Conflicts on water sharing are more complex and difficult to manage than in national basins, because these conflicts are often affected by historical conflicts unrelated to water;
- Circulating water information and data considered as strategic is more difficult, especially when tensions exist regarding water resources.

The legal bases of sovereignty evolved considerably in the 20th century. The "Harmon Doctrine" of "absolute territorial sovereignty" advocated by upstream states was abandoned in 1950, as well as the "absolute territorial integrity" advocated by downstream states. The international community now thinks in terms of a "community of interests" between riparian states, and "limited territorial sovereignty" of shared water resources in order to provide individual riparian states with a reasonable, fair share of water.

The emergence of **supranational governance,** illustrated in Europe by, for instance, the implementation of the Water Framework Directive and its accompanying instruments, (such as the polluter-pays principle, the civil society participation, the cost recovery or the obligation of results in a given time), may require substantially readjusting administration and its response mechanisms. It's particularly true regarding the natural environment. In Africa, some hydraulic structure projects that have involved dialogue via transboundary basin organizations, in consideration with internationally recognized environmental and social standards, have contributed to regional integration.

However, for a long time transboundary water management mostly concerned surface water, rivers and lakes. Transboundary organizations' thinking and scope of action in terms of transboundary aquifer management has only recently moved forward under the impetus of international organizations. Pressure on groundwater is increasing due to changes in consumption, the growing world population and its corresponding needs (agriculture, drinking water supply, industry, energy, climate change, etc.). The impacts can be extremely damaging (lower groundwater levels, deteriorating water quality, land subsidence, saltwater intrusion, pollution, loss of biodiversity, etc.) in the short, medium and long term. They may even be irreversible or generate significant restoration costs. Some aquifer systems are managed unsustainably, compromising access to water for the populations concerned.

Water governance does not just depend on the institutions specifically mandated to manage resources It also depends on the **overall context** in which resource management and issue-sharing is managed, the relationship between this resource and the territories, and the management of activities being developed that have an impact on the water resource. The absence of freedom of speech, public participation and user representation is considered as an obstacle. Similarly, a lack of access to basic information on the qualitative and quantitative status of resources gives projects and government agencies no incentive to report on their efforts to preserve the environment.

Institutional reforms must take into account economic, social and political conditions outside the water sector, such as, for example, commodity markets, which influence the way water is used and governed. Institutions need to develop robust indicators to monitor and assess trends in water governance reform in order to anticipate and meet user needs. This involves improving knowledge on:

- The most favourable types of governance to balanced water resources management and provision of appropriate services;
- The priority components of governance to ensure that access to services is as broad and lasting as possible.

2.2 Governance practices in basin organizations

For each Basin Organization, this document provides information on:

- The bodies of the institution. Thus, the following structures may exist (or equivalent under another name): Summit of Heads of States, Council of Ministers, Committee of Experts, Basin Committee, National Focal Structure, Executive Secretariat, Companies for the management of assets and operating structures;
- The statutes, mandates and related objectives;
- The regional legal framework (possibly a Water Charter);
- Changes since the creation of the institution and recent reforms.

This description may be accompanied by a critical analysis.

2.2.1 *Niger Basin Authority*

(a) Regional legal, statutory and institutional framework

The idea of creating a public organization responsible for promoting the development of the Niger River Basin resources dates back to the colonial era in the early 1950s, with the establishment in Bamako of a Mission for the Study and Development of the Niger (MEAN). In November 1964, the nine states drained by the Niger River and its tributaries created the Niger River Commission (NRC) whose purpose was to "encourage, promote and coordinate studies and programmes related to the development of the basin resources". After 17 years of operating without satisfactory results, the Member States decided, at the Summit of Heads of State and Government held in Lagos in January 1979, to replace NRC by another institution whose tasks would go beyond those of the NRC.

Thus, the Niger Basin Authority (NBA) was created on 21 November 1980 in Faranah (Republic of Guinea), by nine member States: Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger and Nigeria. The topographic Niger River Basin (2,100,000 km^2) covers part of southern Algeria, which obtained observer status in September 2005.

NBA permanent bodies are:

- **Summit of Heads of State and Government**, supreme body for orientation and decision-making which meets once every two years for an ordinary session;
- **Council of Ministers**, NBA's supervising body, responsible for monitoring the activities of the Executive Secretariat and reporting to the Summit. It meets once a year for an ordinary session;
- **Technical Committee** of Experts, composed of representatives of the Member States. It prepares the sessions of the Council of Ministers;
- **Executive Secretariat**, which is the NBA's executive body. It is headed by an Executive Secretary, who is nominated by the Summit of Heads of State and Government. For a period of four year (renewable once), this nomination is made following a proposal from the Council of Ministers;
- **National Focal Structures** established in each member country. These are led by coordinators and act as an interface between regional level (Executive Secretariat) and national level. Depending on the country, this structure comes under the ministry in charge of water, environment, agriculture or land planning.

NBA has sought to develop relations with international or national public and private donors. The Executive Secretary is in charge of finding external funding and relies on a Consultative Committee of Donors.

(b) Mandate and development goals

Since its establishment, NBA's purpose has been to promote cooperation among the Member States and to ensure integrated basin development in the fields of energy, water, agriculture, animal husbandry, fisheries and fish farming, forestry and logging, transport, communication and industry.

However, difficulties encountered in achieving this goal led the NBA to a financial crisis that could only be resolved by organizational restructuring. This was made by moving the goals to correspond more closely to Member States' political volition and financial capacity. Thus, in order to resolve this crisis, , the 5th Summit of Heads of State and Government of October 1987, that took place in N'Djamena (Chad), made the decision to revise the NBA Convention and establish national focal points to liaise between the Executive Secretariat and individual Member States. It also approved a new organizational structure for the Secretariat and a five-year plan covering 1988-1992. The revised 1987 Convention assigned the following five goals to NBA:

- Harmonize and **coordinate** national policies for the development of water resources in the basin;
- Participate in development **planning** through the establishment and implementation of an integrated development plan for the basin;
- Promote and participate in the design and operation of common **structures** and joint projects;
- Control and regulate all forms of **navigation** on the river, its tributaries and sub-tributaries;
- Participate in the formulation of requests for assistance and mobilization of **financial resources** in order to effectuate studies and work necessary to develop the basin's resources.

(c) Governance and decision-making process

Contributions from member countries cover the Executive Secretariat's operations. Studies, projects and programmes are mostly funded by subsidies or loans from development partners.

In February 2002, at the 7th Summit of Heads of State and Government held in Abuja (Nigeria), the Member States' will to reform NBA resulted in decisions related, among others, to:

- a proposal to set up a new allocation criteria for contributions to the NBA operating budget;
- the establishment of a steering committee for NBA technical activities;
- cooperation between NBA and development partners to establish a genuine Integrated Water Resources Management policy;
- exchange of information between NBA Member States;
- a review of the revised 1987 Convention establishing the NBA.

At the same Summit, the Heads of State requested that a clear and shared vision of the NBA should be developed and that Member States should undertake consultation via the NBA for any activity that they might initiate in the basin. From 2003 to 2008, a **Shared Vision process** was set up to establish an "enabling environment" for cooperation through a Sustainable Development Action Plan (SDAP) in the Basin, accepted by all states. This shared vision is close to a "policy statement that defines long-term goals and the commitment of the states". As such, it is a framework for all initiatives of national or regional development in the basin: "*The Niger River Basin, a common area of sustainable development through integrated management of water resources and associated ecosystems, for improving the living conditions and prosperity of the people by 2025*". This is how the nine member countries of the Niger Basin Authority outlined their Shared Vision for sustainable development in the basin.

The Shared Vision process led to the 8th Summit of Heads of State and to the Donors Roundtable held during the first half of 2008, which announced the initiation of several activities, including the construction of new large dams on the Niger River.

In this context, in 2007 NBA carried out some studies to draft its **Water Charter,** which was adopted in 2008 at the NBA Summit of Heads of State and Government. This charter, which gives a nominal basis to all initiatives based on solidarity and cooperation between Member States, has been incorporated into Member States' legal and institutional frameworks.

The Water Charter entered into force on 19 July 2010, with deposit of its ratification instruments to the African Union and the United Nations.

The bodies designated by the Water Charter for good governance of water resources in the Niger Basin are:

(i) Permanent Technical Committee, established to facilitate the settlement of all issues relating to water use. It also contributes to the planning and implementation of any project or programme related to the Niger River Basin. The Permanent Technical Committee is currently being put into operation;

(ii) Regional Advisory Group, responsible for applying management and good governance principles for a sustainable and shared development of the basin;

(iii) Panel of Experts, which acts as an independent expert group in charge of giving specific technical advice on issues related to basin developments;

(iv) Sub-basin Commissions, responsible for proposing terms for water resource use, helping to settle water use conflicts, and collaborating in the planning and implementation of any project or programme concerning the river sub-basin;

(v) Niger Basin Observation System, which aims to monitor changes in the basin's various components. It is in charge of producing periodic information on the basin's development in order to help strengthen NBA's coordination role and improve the jointly coordinated management of natural resources in the basin.

(d) On-going developments

Generally, NBA works on implementing the SDAP and consolidating the achievements of the Shared Vision through:

- Implementing the Water Charter; drafting Annexes 1, 2 and 3 to the Water Charter respectively on:

  (i) Environmental protocol,

  (ii) Coordinated dam management,

  (iii) Notification of planned measures and review of the relevant documents;

  (iv) Sharing of costs and benefits related to structures in the Niger Basin;

- Making National Focal Structures operational;

- Establishing and making operational the National Coordination and Regional Coordination of Users of the Niger Basin's natural resources. For the first time, the Shared Vision process has made it possible to bring together civil society organizations from the Niger Basin to discuss matters of general interest with states and partners;

- Implementing and developing projects and programmes included in the Investment Programme up to 2027;

- Adopting innovative and sustainable financing mechanisms for NBA and looking for ways and means to implement them;

- Establishing a network of Parliamentarians and Ministers of Finance responsible for lobbying institutions from each NBA Member State to ensure and increase their financial support.

NBA is currently at a turning point. It has been recovering from its difficult situation since 1998 and has now achieved the genuine standing of a regional institution, although it still only plays an informative and advisory role. As announced by ministers in Yaoundé in January 2004, NBA must now take up a role of regional referee to merit its status as an authority. In 2013, NBA was still not in a position to delegate the contracting of major hydraulic structures.

(e) Strong points – weak points

Strong points

In a relatively short time (five years), NBA and its member countries, supported by partners, have developed a process leading to a consensual investment programme (see chapter on planning) and the development of a transboundary legal tool (the Water Charter). This was possible thanks to strong common political volition: during this period Heads of State met three times and ministers up to three times per year. Other more technical progress has been achieved in terms of hydrological monitoring and observation (see chapter on monitoring), decision-making support tools and silting control.

Technical and financial partners were able to coordinate throughout the process, and even obtain pooled funding. In addition, the basin water users were also gradually associated with activities implemented in the basin.

Finally, in 2007, NBA started a major project amounting more than 500 million dollars with funding from the World Bank. This project includes, in particular, the rehabilitation of existing large hydraulic structures (Kainji, Jebba in Nigeria and Lagdo in Cameroon) and technical studies for upgrading those planned, such as Fomi in Guinea, Taoussa in Mali and Kandadji in Niger.

Weak points

The basin's inherent characteristics generate governance difficulties:

- The consequence of the Presence of 9 Member States (8 French-speaking and 1 English-speaking) is decision-making cumbersome. This leads to difficulties in identifying common interests;

- Inequality with respect to the availability of the resource (downstream/upstream position; country bordering the mainstream / tributaries);

- Management problems and tensions regarding the resource and high stakes in terms of sustainable development.

NBA has experienced cyclical developments while implementing its mandate. For a long time, knowledge on the status of the basin's development was insufficiently consolidated. To date, despite the Shared Vision process, Member States still sometimes limit themselves to national resource management. The huge work made in the process has so far led to a sum of national structures that are neither fully optimized nor coordinated.

Some decisions made several years ago have not been fully put into effect, such as the creation of National Focal Structures (not entirely operational), the institutional reorganization needed for implementing the investment programme, and the establishment of a Permanent Technical Committee. Chronic difficulties in recovering state contributions (despite a temporary improvement during the process) generate large arrears and give out negative signals to partners.

Communication and exchange between NBA and its Member States (the National Focal Structures and national services involved) need to be improved and should especially lead to a two-way information system with Member States.

2.2.2 *Volta Basin Authority*

(a) Regional legal, statutory and institutional framework

The Volta is a transboundary river system that, for several years, remained one of the few large African river basins without any legal and institutional arrangement between riparian countries regarding the management of its resources. With a view to the sustainable management of transboundary water resources, ministers in charge of water resources in the riparian countries established the Volta Basin Authority (VBA) on 16 July 2006 in Lomé.

The Convention was signed on 19 January 2007 in Ouagadougou by the Heads of State of the riparian countries; it entered into force after ratification on 14 August 2009. The permanent bodies are:

- Conference of Heads of State and Government;
- Council of Ministers in charge of water resources;
- Stakeholders' Forum for the development of the Volta Basin;
- Committee of Experts;
- The Executive Directorate of the Authority.

To ensure effective international cooperation, VBA, in addition to statutory bodies, established an advisory group of technical and financial partners whose main objective is to promote synergy in terms of technical and financial assistance.

(b) Mandate and development goals

The Volta Basin Authority's aims to promote permanent dialogue and sustainable development of water (and related resources) in order to fairly share benefits to alleviate poverty and achieve better socio-economic integration. Under Article 6 of the Convention on the status of the Volta River and creation of the Volta Basin Authority, the Authority's mandate is to:

- Promote tools for permanent dialogue between stakeholders in the basin's development;
- Promote the implementation of integrated water resources management and fair sharing of the benefits arising from their different uses;
- Authorize the implementation of structures and projects planned by the states involved that may have a significant impact on the basin's water resources;
- Carry out joint projects and work;
- Contribute to poverty alleviation, sustainable development of the states involved, and participate to improved socio-economic sub-regional integration.

Due to the "newness" of VBA, whose Convention has only been in force since 2009 (although activities started in 2006), several components of this mandate have not yet been achieved. For instance, regarding hydraulic structures and benefit sharing, VBA does not fully play its role of regional integration, although it is currently preparing a Volta Basin Master Plan.

(c) Governance and decision-making process

The Volta Basin Authority's vision is, "A Basin shared by partners motivated by good will and a spirit of cooperation, managing their water resources in a sound and sustainable manner for their overall socio-economic development". The Volta Basin Authority, in collaboration with its key partners, has identified the following **strategic objectives** for 2010-2014:

- Strengthen policies and the legislative and institutional frameworks;
- Increase knowledge of the basin;
- Ensure coordination, planning and management;
- Develop communication and capacity building for all stakeholders;
- Strengthen VBA's operational capacity.

These strategic objectives constitute VBA's medium-term framework for action, and should be considered as interdependent. The five-year strategic framework represents the guidelines for the Authority's first few years in terms of its organizational, technical, political and financial aspects.

(d) On-going developments

VBA's role doesn't require only establishing bodies and making them operational, it involves gradually putting together a genuine basin policy. A **Water Charter** will be an opportunity to define the principles, terms and conditions for allocating water between uses; the rules for approving new projects that require water or generate pollution; the conditions for preserving aquatic environments; and the participation of all stakeholders in decision-making with respect to water resources management.

A **Basin Master Plan** should be drafted, which is the main planning tool developed using decision-making supporting tools. A Water Management and Regulation Committee will be established in the Volta Basin for future planning of joint structures. As a first step, the committee should initiate a consultation phase to ensure that the main structures in the basin are efficiently managed for the basin's hydrological and hydrodynamic operations.

The construction of several large dams in countries of the Volta Basin, and the widening of small reservoirs in the northern part of the basin are planned in the coming years. In addition to its traditional coordination tasks, VBA will establish organizational arrangements for better water resource planning and management, especially to coordinate existing and future projects in the basin.

To ensure the success of other strategic goals, VBA should initiate a capacity building process. With a main focus on the technical skills needed to implement its strategic plan and achieve financial autonomy. The following priorities would ensure the development of major technical and institutional processes to guarantee its effectiveness:

- Establish a separate budget to comprehensively conduct all studies and take care of the daily operations of basic structures;
- Finalize the observation system, launch the Master Plan and formulate and implement the Communication Plan;
- Establish and coordinate the national focal structures;
- Recruit the technical and administrative teams, experts, project managers and office staff required for achieving specific objectives;
- Promote new partnerships with technical and financial partners.

(e) Strong points – weak points

On one hand, VBA is a young, dynamic, responsive structure. Its governance includes innovative structures such as the Stakeholders' Forum and the Committee of Technical and Financial Partners, which shows that VBA has learned lessons from the similar experiences of other transboundary basin organizations.

On the other hand, the Authority's Executive Directorate is still too small to be able to easily fulfil the tasks normally assigned. The status of its leaders should be consolidated. Bodies do not meet frequently enough to correspond to current needs.

The basin's configuration means that Burkina Faso and Ghana are the main driving countries. Interesting experiences are emerging in their national sections. The focus should now be on strengthening **coordination between national and regional levels**, possibly involving institutionalization.

A **strong political volition to develop joint projects** is the best guarantee of harmonious development meaning balanced and coordinated operation. Genuine technical and financial resources should thus be mobilized to implement the decision-making process (especially potentially helpful strategic modelling tools) and **water resources planning and management in the basin**. Experience shows that this process takes several years.

Just as for NBA, many stakeholders prefer to invest in large hydraulic structures (dams). Do alternatives exist with more beneficial economic, social and environmental impacts? Each project needs a careful analysis of advantages and disadvantages of the existing alternatives, to recommend the best solution, incorporating the cost of environmental and social externalities.

2.2.3 *Water Resources Coordination Centre*

(a) Regional legal, statutory and institutional framework

The Regional Water Resources Coordination Centre (formerly Unit) (WRCC) is one of the four bodies defining the Permanent Forum for Coordination and Monitoring (PFCM) for IWRM and the Regional Action Plan established within ECOWAS on 21 December 2001. It is an executive body with the rank of Department of the ECOWAS Commission, while the Regional Council for

Consultation on Water Resources (RCCWR) is a consultative body of the Ministerial Monitoring Committee and made up of representatives of all stakeholders in the region's water sector.

(b) Mandate and development goals

Three main areas structure the WRCC strategic programme:

- Direct support to the water sector: specific support to countries, transboundary basins, regional thematic programmes;
- Integration and development of the sector: development of the sector's strategic framework, management and information sharing, reinforcing the sector's funding capacity;
- Coordination and monitoring: links with organizations and initiatives in the sector, operation and financing of PFCM.

(c) Governance and decision-making process

The Water Resources Coordination Centre, based in Ouagadougou and placed under the authority of the ECOWAS Commissioner of Agriculture, Water and Environment, has been facilitating dialogue on water resources since 2004. It implements the Regional Water Policy and the PFCM's 2007-2015 Strategic Plan and carries out the Regional Action Plan for Integrated Water Resources Management.

WRCC's activities focus on the following three outcomes:

- Support for countries **and basins** in the implementation of their plans and strategies for integrated water resources management,
- Regional integration in the water sector,
- Coordination and monitoring of implementation of the Regional Action Plan for IWRM.

Currently, all of the above-mentioned institutions are combining their efforts to accomplish the West African Vision for Water, Life and the Environment in 2025. This means following the objective that "all people of the region have access to drinking water supply, sanitation facilities, food security, that the West African region achieves food self-sufficiency, that the degradation of water resources is stopped and that the health and biodiversity of aquatic ecosystems are restored", (Declaration of Ouagadougou, 2000).

In 2008, a Regional Policy on Water Resources was adopted with the CILSS and UEMOA, thus fulfilling a strong political volition which remains to be implemented. This volition is reinforced by a supranational principle, making ECOWAS directives directly enforceable at country level.

Since 2008, WRCC's activities have included leading a dialogue on major infrastructure projects in the water sector. A panel of experts has produced recommendations on best practices for the development of sustainable water infrastructure in West Africa (see chapter on planning).

In the same vein, a regional consultation on major infrastructure projects in the water sector in West Africa is being implemented in partnership with the International Union for Conservation of Nature (IUCN). It opens up the debate to civil society stakeholders, especially representatives from local communities and resource users, who are all too frequently overlooked in consultation and decision-making processes.

WRCC is working on establishing a regional water observation system (metadata) to make consolidated analyses at all levels (see chapter on monitoring).

(d) On-going developments

Different initiatives in the WRCC regional programme have strengthened transboundary water management, by improving knowledge and promoting best practices. These include in particular:

- AfDB-supported initiative to control invasive aquatic plants, including developing practical operations at country-level;

- Validation in 2008 at community level and in collaboration with UEMOA and CILSS of the regional policy on water resources with particular emphasis on the importance of transboundary basin organizations;
- An atlas of water resources in West Africa, produced in 2010 and providing a detailed description of the resources and uses in the region's major basins;
- On-going debate on the establishment of IWRM monitoring indicators under the regional water resources observation system project;
- Dialogue, conducted with IUCN since 2009, on major water infrastructure in West Africa, in which transboundary basin organizations are interested parties;
- Continuing training activities on water and climate change issues for national and basin organizations' managers.

After actively participating in launching the national IWRM plans, WRCC has widely focused on transboundary management. For instance, it facilitated the creation of the Volta Basin Authority and it is currently supporting the establishment of three new transboundary authorities i) Comoé-Bia-Tano; (ii) Mono; (iii) Cavally-Cestos-Sassandra. Support for the Mono Basin (between Togo and Benin) is now the most advanced: a roadmap has been adopted and a technical basin committee has been set up.

In addition, by systematically involving the Mano River Union in its technical and political meetings, WRCC enabled this institution (whose objectives were initially limited to issues of post-conflict Economic Cooperation) to play a role in water management, which is currently taking shape thanks to IUCN support.

WRCC thus provides both direct support to structures and indirect support through backing targeted interventions with donors (e.g. support from SIDA - Swedish Cooperation - in the Mono Basin).

The guide on water sector funding, produced by the WRCC in 2006, also participated in developing cooperative action aimed at basin organizations.

(e) Strong points – weak points

The WRCC mandate makes this structure beneficial for all water stakeholders in the Region. Nevertheless, WRCC suffers from:

- A lack of human resources, similar to VBA;

- Cumbersome procedures, especially financial ones, due to its strong dependence on the ECOWAS headquarters in Abuja.

2.2.4 *International Commission of the Congo - Ubangi - Sangha Basin*

(a) Regional legal, statutory and institutional framework

The Agreement of the Heads of State (Cameroon, Central African Republic, Congo and the Democratic Republic of Congo) signed on 6 November 1999 established a standard flow regime and created CICOS. Its primary objective was to promote regional integration through sustainable and equitable use of the waterways (that make up the Congo River and its major tributaries) for navigation purposes. CICOS is consequently responsible for monitoring the application of the CEMAC[1]/DRC Code of Inland Navigation.

The implementation of the agreement establishing CICOS was not effective until the end of 2003 because of regional conflicts. Based on the purposes of the initial Agreement limited to navigation, an Addendum expanding CICOS tasks to Integrated Water Resources Management was signed by the Member States on 22 February 2007.

CICOS is a specialized body of CEMAC, whose Heads of State and Government adopted a self-financing mechanism, the Community Integration Tax (CIT). In all the countries of the community, this tax is applied at the rate of 1% of the Cost Insurance Freight value of the goods imported from third countries and intended for consumption. The CIT represents 70% of its funding. The Democratic Republic of Congo which is not a CEMAC member directly contributes (see chapter on funding).

(b) Mandate and development goals

The addendum to the agreement establishing CICOS extends its initial mandate so that it is now considered as a legitimate and recognized regional institution in the field of IWRM. This addendum:

- sets out the **principles and conditions for using water** from the river and its tributaries between different sectors of use;
- defines the procedures for the **review and approval of new projects** that may affect water quantity and quality;
- determines the rules relating to the preservation and **protection of the environment**, ecosystems and wetlands in particular;
- defines the framework and conditions for **water users' participation** in decision-making;
- **increases cooperation** through the use, management and conservation of water and resources from the river and its tributaries. It also promotes the optimization of water uses in order to minimize the negative effects that could result from competition between states.

In 2010, CICOS produced the Strategic Action Plan for integrated water resources management in the Congo Basin. Regarding navigation, CICOS assists Member States in maintaining and updating a computerized register of fleet units operating on the waterways of the Congo Basin. CICOS also helps States combating red tape in order to facilitate transport by inland waterways and promote interstate trade. Under its impetus, a Convention for the use of Pool Malebo (liaison between Kinshasa and Brazzaville, the closest capital cities in the world) was signed by ministers from the Republic of Congo and the Democratic Republic of Congo.

(c) Governance and decision-making process

CICOS statutory bodies are:

- The Committee of Ministers - decision-making body;
- The Executive Committee - advisory body;
- The General Secretariat - executive agency.

[1] Economic and Monetary Community of Central Africa

The Committee of Ministers meets in an ordinary session once a year, preceded by a meeting of the Executive Committee.

Following the signing of the addendum in 2007, it was necessary to provide the organization with a new institutional environment in order to meet the requirements of its new tasks. A new organizational chart of the General Secretariat was adopted by the Member States.

(d) On-going developments

The Congo-HYCOS hydrological monitoring project started in late 2012 in collaboration with WMO.

A decision-making support tool for the prospective planning of large hydraulic structures is being developed. This tool will notably allow the development of a master plan for water development and management, which will specify the Strategic Action Plan.

In January 2010, the CICOS Committee of Ministers validated the Terms of Reference for an institutional audit whose objectives are to:

- Analyse the causes of institutional difficulties encountered by CICOS during the past two fiscal years;
- Identify scenarios for links with CEMAC;
- Propose a sustainable financing mechanism;
- Examine the possibility of joining ECCAS[2] ;
- Allow the operational implementation of the "IWRM" addendum;
- Propose a form of involvement for the different categories of stakeholders.

The addendum to the agreement establishing CICOS underlines that, "projects likely to have significant impacts on shared waters, (...) shall be subject to a review by the Commission and/or consultation with other Contracting States prior authorization". A coordinated basin-wide review of the various scenarios combining large hydraulic structures and prospective planning of their implementation requires a specific decision-making support tool, currently being employed by CICOS.

Besides hydropower dams, significant major structures include a water diversion project from the Ubangi to Lake Chad. In 2006, ECCAS mandated CICOS to defend the interests of the countries providing water resources in this diversion project. For this purpose, CICOS and the Lake Chad Basin Commission (LCBC) meet regularly in a Joint Committee. Moreover, in addition to the "Feasibility study of the project for water diversion from the Ubangi to the Lake Chad Basin" carried out by the LCBC, CICOS produced the Terms of Reference of an impact study about the diversion project on the Congo Basin, approved by the CICOS Committee of Ministers in January 2010.

(e) Strong points – weak points

The relatively recent creation of CICOS was clearly a response to countries' expectations. Now results are beginning to take shape (e.g. establishment of a regional training centre for inland navigation) but could be improved on and added to.

Gabon has recently joined the institution, although it only covers a very small portion of the basin, since the country's main river is the Ogooué (which, although transboundary, is not managed by any organization). Negotiations have been ongoing for several years with the Republic of Angola for its accession to CICOS. Angola participates in CICOS meetings as an observer.

Four other countries cover the east of the basin (Great Lakes), but are not CICOS members: Zambia, Tanzania, Burundi and Rwanda. A Lake Tanganyika Management Authority (the lake is included in the Congo River Basin) was established in 2006 and maintains institutional relations with CICOS.

The possibility of establishing a committee gathering CICOS' Heads of State (who created the institution) has been mentioned several times.

[2] Economic Community of Central African States

"Relay structures" are being put into operation within the countries to coordinate and serve as an interface between the General Secretariat and Member States. Development of these structures is struggling, but it is linked to the progress of national IWRM processes).

Human resources within the institution should be expanded, e.g. only one in three manager positions was filled in early 2013. The Congo Basin's information system needs to be made totally operational, especially for hydrological monitoring.

2.2.5 *Organization for the Development of the Senegal River*

(a) Regional legal, statutory and institutional framework

The Convention of 11 March 1972 established the Organization for the Development of the Senegal River (OMVS). This Convention defines the overall structure, the nature of the relationship between bodies and structures, and the embodiment of the organization through the High Commission without prejudice to the separation of functions.

As well as the current organization of the High Commission and the Management Companies in charge of Common Structures, OMVS' current Institutional Framework results from a 1996 reform initiated by Member States. Its permanent bodies are:

- Conference of Heads of State and Government;
- Council of Ministers;
- High Commission, executive body;
- Two management companies: Company for the Management and Operation of Diama Dam (SOGED) and Company for the Management of Manantali Hydropower (SOGEM).

The OMVS participatory framework also relies on advisory bodies:

- Basin Committee;
- Permanent Water Commission;
- Regional Planning Committee;
- Consultative Group of donors;
- National (CNC) and local (CLC) Coordination Committees established under the Environmental Mitigation and Monitoring Plan - EMMP;
- User Associations (UA).

OMVS participatory framework

The *User Associations* are intended to gather people concerned by one or more specific activities. Linked by a common interest to facilitate their regrouping, these populations are thus more motivated and more able to manage and maintain all assets available to them. User associations are thus the first stage of participation in the management of the river, and OMVS wishes to encourage them. They give inhabitants a sense of responsibility on common goals and develop their awareness of IWRM. This should have made it easier for representatives from these associations to access spokesman positions and encourage their involvement by representing these categories of users in decision-making or dialogue bodies, at Member State, sub-basin and basin levels.

This is an operational level since an association is a recognized structure, which has legal status and as such can undertake concrete actions (work) or receive funding (subsidies, loans, etc.).

However, OMVS also promotes the establishment of Local Water Committees (LWC), local bodies for dialogue between water users in a relatively small area of a river that allow stakeholders to meet easily, with the main objective of discussing problems regarding water resource use and resolving any conflicts that may arise from it. It is, in fact, a local structure similar to a basin committee which itself concerns an entire river basin.

The *Local Coordination Committees* (CLC) were set up within the states a decade ago at departmental level under the EMMP project. They should be at the heart of the participation system to ensure its consistency and representativeness and to act as a transmission passage between OMVS activities and the local populations.

Some difficulties or malfunctions have been identified: difficulties in the information flow between CLCs; members' lack of involvement; lack of clarity in their missions; lack of resources for operation, etc.

Thus, the High Commission plans to revise the composition of the CLC and possibly the way that representatives of the various stakeholders are designated in order to ensure that they are fairly represented.

The *"Basin Committee"* would also merit an assessment regarding: its representativeness and effectiveness; whether its results can be evaluated in relation to the costs; whether the general interest prevails over special interests.

National OMVS units serve as focal points and liaise with states on all the organization's activities. They are supervised by ministries in the Member States and receive financial support from the High Commission, SOGEM and the supervising ministry on which they depend.

Over the years, OMVS has acquired a legal framework that revolves around four Conventions, signed by the Heads of State and ratified by the parliaments of the member countries.

- Convention on the Legal Status of the Senegal River:

This was signed on 11 March 1972. In this Convention, the Senegal River, including its tributaries, is declared to be an "international watercourse" in the territories of the Republic of Mali, Republic of Mauritania and the Republic of Senegal. It guarantees freedom of navigation and fairness for all types of the river water's uses.

- Convention establishing OMVS
    - Convention on the Legal Status of Common Structures

This was signed on 21 December 1978 by the Heads of State and Government of Mali, Mauritania and Senegal. This Convention establishes the legal status of common structures, and defines the rights and obligations of the co-owner States as well as the modalities for the establishment of Agencies for the Management of the Common Structures. It occupies a

central place in the legal system, as it affirms the character of indivisible common property of OMVS common structures.

- Convention on the financing of Common Structures

The Convention of the financing of Common Structures complements the legal arrangement. Signed on 12 March 1982 in Bamako, this Convention plans the funding of the OMVS programme (contributions, loans, subsidies). It also guarantees mechanisms for lenders (collateral security) and allocation criteria for costs and charges between the member countries, which may be adjusted, if necessary, according to the actual benefits gained by each Member State.

This basic legal arrangement was supplemented in 1987 with two Conventions establishing structures for the management of the Diama and Manantali dams (built respectively in 1988 and 1990): the Company for the Management and Operation of Diama Dam (SOGED) and the Company for the Management of Manantali Hydropower (SOGEM).

(b) Mandate and development goals

When OMVS was established in 1972, its initial tasks focused on five areas:

- Ensuring food self-sufficiency in the Contracting States;
- Reducing economic vulnerability to climate hazards;
- Accelerating economic development;
- Preserving the balance of ecosystems;
- Improving and securing populations' incomes.

OMVS's initial objectives are defined in the 1974 Development Plan and the 1976 Action Plan, which planned for:

- The Diama anti-salt dam for the development of irrigated crops in the valley;
- The Manantali Dam for flood management, regulation of downstream flows, power generation, irrigated agriculture and inland waterways navigation (improving navigation and multimodal transportation is a priority for OMVS);
- The high voltage supply lines to the cities of Bamako, Dakar and Nouakchott for electricity supply;
- The river ports and St Louis seaport.

After more than thirty years of operation, OMVS has enabled its Member States to:

- possess a remarkable cooperation tool, capable of mobilizing its partners to design and implement large-scale projects that no country could carry out alone, (e.g. dams, hydropower plants, high voltage supply lines, fibre-optic networks, access roads for structures, embankments, support to the development of irrigation);
- reduce the recurrent risk of famines and natural disasters related to the random cycles of drought and flood, and other constraints in the Sahel region;
- bring down their chronic energy deficits by maintaining maximum annual production at the Manantali dam (above contractual requirements);
- build the Diama dam;
- make it easier to solve water supply problems in Nouakchott and Dakar;
- develop technical tools for continuous monitoring of the environment and flow rates;
- provide a framework for consultation, which is a guarantee for political stability, and peace.

(c) Governance and decision-making process

The OMVS governance model is exceptional at regional, African and even global levels, due to the joint ownership of large structures, the guarantee of fairly sharing the benefits of water resources management, or the concerted and balanced operation of its structures. .

The decisions made by the Conference of Heads of State and Government and the Council of Ministers are adopted unanimously rather than by majority vote. The passage from 3 to 4 States in March 2006, with the return of Guinea alongside the three founder members required adaptation. This means amending the founding texts, adjusting the structures and the way

bodies function, including the representation in decision-making processes and equitable sharing of costs and charges.

The incorporation of IWRM principles also required changing texts. This was the case for the **Water Charter of the Senegal River** dating from 28 May 2002. This instrument of international significance:

- Sets out the principles, terms and conditions of water sharing between different sectors of use;
- Defines the principles of water use and the methods of examination and approval of new projects;
- Determines the rules for environmental conservation and protection;
- Defines the framework and modalities of water user participation in decision-making on resource management.

The **Nouakchott Declaration** was adopted in 2003 and designed to act as the organization's roadmap for the next 20 years. It aims to update and align the OMVS objectives, (some of which were defined in the 1970s) with the latest orientations of the Conference of Stockholm on the Environment, the Conference of Monterrey on Development, the World Summit on Sustainable Development, the NEPAD and the Kyoto Forum. It is based on three principles, fifteen strategic goals and four decision-making support tools (Master Plan for Water Development and Management, needs/resources management chart, Environmental Observation system and Strategic Action Plan).

The participatory approach implemented by the OMVS for the development of the Senegal Basin's SDAGE means that inhabitants can now be involved (see chapter on planning).

The OMVS is currently pursuing its efforts to achieve the following objectives:

- Increase hydropower production to establish an enabling environment for a controlled decrease in production costs. This may be done with the building of run-of-river structures ("second generation" structures);
- Control, regulate, secure and diversify water resources to satisfy the immense demand. Efforts are focused on carrying out basic studies and studies of the Gourbassi Dam.

Performance contracts with the "National Executing Agencies"

In accordance with the recommendation made in the study of the reform in 2008, the OMVS is developing an interesting experience as a contracting agency, which involves signing Performance Contracts with national stakeholders (National Company for Rural Development – SONADER in Mauritania, General Directorate of Rural Engineering - DGNR in Guinea, Rural Development Agency for the Senegal River Valley - ADRS in Mali, National Company for the Development and Exploitation of the land of the Senegal River Delta, of the Senegal River valleys and of Faleme (SAED)).

These agencies thus support the OMVS in the implementation of activities, e.g. the preparation, implementation, operation and optimal maintenance of hydro-agricultural developments planned in a specific project:

- Organization, preparation and follow-up of studies, works, purchase and installation of equipment goods;
- Advisory support, supervising, awareness and training of farmers for the efficient use and proper maintenance of the hydro-agricultural structures built;
- Incorporation of environmental measures.

The contract defines and regulates the Agency's assignments, the procedures for approving reports and contracts, the staff to be mobilized, completion deadlines, methods for administrative, technical, financial and accounting controls, acceptance of works, supplies and services, the handing over of works and the remuneration of the Agency with regard to commitments made (staff involved, compliance with environmental provisions, compliance with reporting deadlines), as well as any penalties in case of breach of obligations.

(d) On-going reforms

As mentioned above, OMVS is a remarkable cooperation tool with a legal and institutional framework that is stable with practical results, benefiting from strong political commitment. However, it also has the potential to do more and needs to face new challenges related to the integration of Guinea, the implementation of the Declaration of Nouakchott and the Water Charter, the apparition of a truly integrated water resource management, and the development of navigation and second- and third-generation hydropower projects.

Various avenues were suggested by IOWater during the study of OMVS institutional reform in late 2008. Some of these have been implemented; others are still under study to further improve governance.

Controlling corporate governance also requires a suitable structure. Usually, the corresponding functions go beyond their role of "control" and become genuine tools to improve performance and results, integrating performance and quality indicators.

(e) Strong points – weak points

As a "permanent framework for dialogue" between Heads of State, Member State ministers and technicians, OMVS has proven to be an effective instrument for preventing and managing conflicts. It has provided many services that go beyond sharing the Senegal River Basin's water resources and energy.

History shows that OMVS results from forty years of riparian states' keen readiness to cooperate in the rational and joint exploitation of Senegal River resources, based on:

- Freedom of navigation;
- Indivisible ownership of common structures and joint surety for their financing;
- Fair and reasonable allocation of water resources and the benefits gained by the users;
- Equitable sharing of costs and charges between the Member States;
- "The obligation for each riparian State of informing the other riparian States before undertaking any action or project that could have an impact on water availability and/or the possibility of implementing future projects" (wording of the Water Charter).

After the partial building of the *'first step'* structures (*Diama, Manantali, access roads and embankments*), OMVS began an important transformation in order to fit in with the requirements of sustainable development and those of the *'after dam'*, through studies conducted under the EMMP Programme (Environmental Mitigation and Monitoring Plan). This involves taking into account the new ESIA requirements, opening up the participatory framework to all stakeholders concerned, creating the Environmental Observation System, and establishing a needs/resources management chart.

However, several observers have noted that OMVS could do more and better by correcting several shortcomings, including:

- The framework of the relationship between the High Commission and the two companies, which shows some imperfections. The High Commission notably does not seem to be fully able to participate in making decisions on the governance and management of the companies, even though some of these decisions are strategic and affect the entire OMVS system:
- Incomplete transposition, in the texts and institutional framework, of the provisions of the Water Charter and of the recently adopted International Code on Navigation and Transport on the Senegal River;
- Significant increase in expenses for each structure over the past 5 fiscal years;
- Insufficient prospective approach to identify additional resources;
- Rules on human resources management could be improved, to allow, e.g.
    - To limit the mandate of experts whose performances are below the requirements of a work programme that could be defined annually;
    - Alternate performance of duties;
- Hybrid Governance (company management and political decisions) of the Structure Management Companies (SOGEM and SOGED).

(f) Recent developments: provisional organization of port and navigation activities

The OMVS Navigation Project is an interesting example of an interface between governance and funding.

The institutional and legal framework that covers the development of the Project for Navigation on the Senegal River is clearly defined by the conventions and legislative texts of the OMVS, but also the national laws of the Member States and the international treaties ratified by them. This framework should be supplemented by a legal instrument to determine the components and characteristics of each structure (or type of structure) to be built. This specific instrument should also define how each structure's operating costs and charges are to be shared.

The general contractual framework to be implemented is organized in three steps as follows:

- Funding phase: contracts for loans, subsidies and grants will be established;
- Construction/development phase: contracts for works and service provisions (contracting assistance and project management) will be established;
- Operating phase: operation and maintenance contracts will be signed with private operators.

In addition:

- Pricing protocols will be signed with the waterway users along with others protocols to ensure the financial viability and sustainability of the Navigation Project;
- The issue of the sharing of costs and benefits of the Navigation Project will be adequately addressed, because it will determine the establishment of the financing plan for the Project.

Generally, operation, maintenance and/or renewal of infrastructure, equipment and port facilities will be subject to concession or management contracts signed between the Company for the Management and Operation of Navigation on the Senegal River (SOGENAV) and selected private operators.

Model proposed for ore transport on the river:

A Joint Development Agreement (JDA) is planned for transporting ore on the Senegal River. This JDA will be established between OMVS(through SOGENAV), the mining companies of the Senegal River basin and a developer for the structures to be built. The JDA shall state some mutual commitments between the "parties" for the project's development.

The development, construction, rehabilitation, ownership, financing, management, operation and maintenance of port facilities, to be located at different points on the Senegal River and the navigable channel, will be identified accurately by the "parties" during the phase of developing. It will come with structuring of a commercially viable waterway transport company, including a management company for St Louis seaport, ore docks and the navigable channel of the river, owned and managed by private interests. The project will include long-term agreements with port operators and carriers on the river, such as operators of iron-ore, bauxite and phosphate mines, which are sufficiently large to encourage private sector investment in the project.

The parties will agree to cooperate and collaborate on the project's development in an exclusive, confidential, quick and rational way, and allocate the necessary resources to the project for achieving the development tasks and goals, including in terms of personnel.

The parties will agree to prepare a development schedule, that sets out deadlines and critical tasks to be carried out during the development phase of the project. It will be updated from time to time if needed.

The parties shall establish a Management Committee, which will consist of an agreed number of members nominated by each "party". The Management Committee will deliberate on all issues related to the development of the project, including, without limitation: the

authorization and supervision of the development budget and schedule, the selection of third-party advisory parties, the acceptance of other investors, the approval of the financial conditions and the project's legal and commercial structure.

As soon as possible after the JDA enters into force, the "parties" shall prepare a development budget for approval by the Management Committee, providing an estimate of the anticipated development costs (including contingencies) attributable to the "parties", from the date that the JDA enters into force until the financial closing or sale of the project shares.

During the development phase, the "parties" shall constitute an *ad hoc* body (the "Project Company") that will hold all the development rights since their creation (or their development). All the development Rights created by the "parties" before the establishment of the Project Company will be transferred by the "party" concerned to the Project Company. The Project Company will belong to all the "parties" (or their affiliates), and each of them shall finance a registered share of their capital at the time of the establishment of the Project Company, in conformity with the agreed ownership percentages (it being understood that the Developer of the structures and SOGENAV will hold a majority share of the Project Company during the development phase, the amount being determined by mutual agreement in the JDA). At the Financial Closing of the Company, the "parties" have planned that the "Project Company" will merge with (or be acquired by) a newly established Company for the Management of St Louis seaport and the river.

The "parties" plan the establishment of the Company for the Management of St. Louis Seaport, ore docks and navigable channel of the river ("SGPF") to manage the port facilities and any related service from the start of construction and throughout the period of its activity. The SGPF will intervene under a concession contract with SOGENAV. It will be responsible for the project's construction agreement = and for the lease contracts with operators, for maintaining the basic infrastructure of SOGENAV and the development of any additional port services within the scope of its responsibilities.

2.3 Summary and recommendations on governance

2.3.1 *Performance indicators related to governance*

From 2007 to 2010, the "Development of IWRM performance indicators for managing African transboundary basins" project (KPI "Key Performance Indicators") was used to develop appropriate indicators more in line with the realities of transboundary basin organizations. The indicators thus obtained to assess the quality of governance implementation in basin organizations and the results observed in the field. They are tools for assessing progress in IWRM implementation, but also a tool for communication with local partners, water users and donors.

These indicators have been defined for the transboundary river basins of the Senegal, Niger, Congo, Volta and Gambia rivers, as well as for the Victoria and Chad lake basins. The governance indicators are given below.

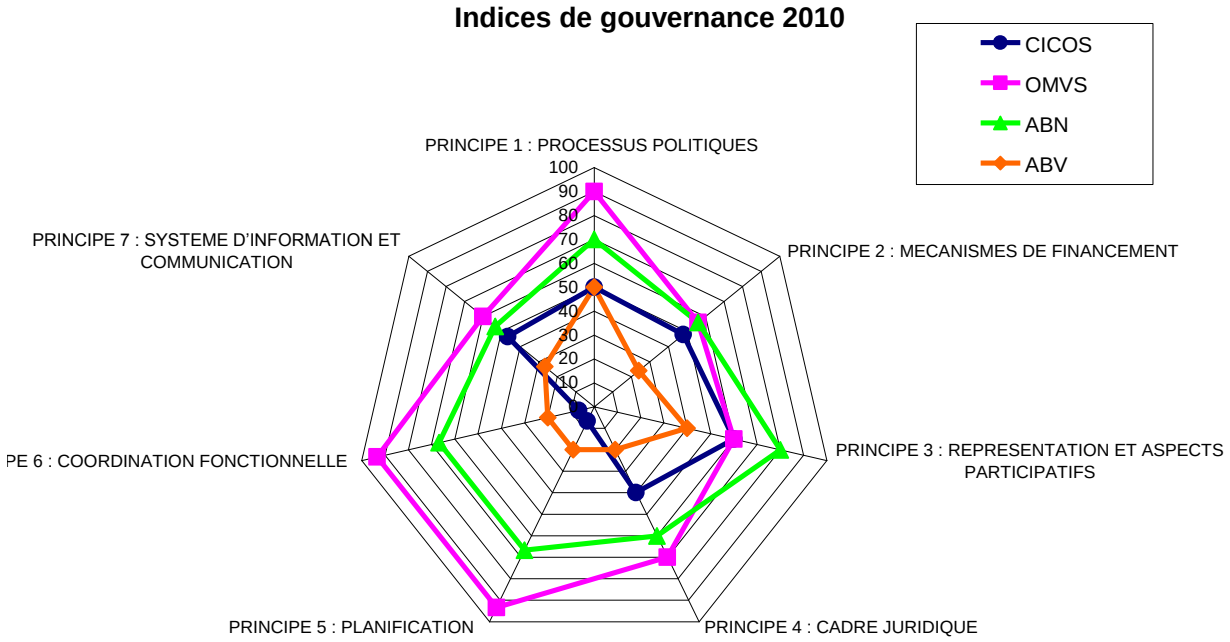
Score	Meaning
0	NOT APPROPRIATE OR LACK OF CONVINCING ELEMENTS
1	VERY LOW
2	LOW
3	AVERAGE
4	HIGH
5	VERY HIGH

	Indicator	GLOSSARY – Meaning of each indicator	Effectiveness [scores from 0 to 5]	INDEX RESULT (%)	Conclusive elements (in the absence of conclusive elements, the efficiency score is taken to be nil)
PRINCIPLE 1: POLITICAL PROCESSES					
G1	Political commitment	Political commitment of the States in the governance and operation of the basin organization			
G2	Sharing of benefits	Mechanism for fair sharing of the benefits gained from the use of water resources between the basin's countries			
PRINCIPLE 2: FINANCING MECHANISMS					
G3	Continuous funding	Continuous funding by States of the basin's governance structure in spite of changes in administration at national level			
G4	Financing consistent with objectives	Financial resources genuinely mobilized for basin development and management as compared to the budget planned in the 10-year Master Plan (or Plan)			
G5	Efficiency	Ratio between the operating costs of the basin organization and the financial resources mobilized for the plan's implementation in the basin			
G6	Application of user-pays and polluter-pays principles	Contributions from basin's water users and their use for operational activities and/or investments in the basin			
G7	Coordination with the donors	Actions of the basin organization for good coordination with the donors, to make sure that the programmes and projects financed in the basin are consistent			

PRINCIPLE 3: REPRESENTATION AND PARTICIPATORY ASPECTS					
G8	Representativeness	Balance in the political representativeness (in the bodies) and technical representativeness (in the executive body) of basin organization Member States			
G9	Participation of water users	Mechanisms allowing the water users to participate in the decisions of the basin organization (integrating gender issues and poor populations)			
PRINCIPLE 4: LEGAL FRAMEWORK					
G10	Legislation at the level of the basin organization	Legal framework related to the basin organization's mandate and structure, and texts about the financial mechanisms and water management at regional level, adapted to IWRM requirements			
G11	Consistent national / regional legislation	National water laws consistent with the basin organization's legal texts			
PRINCIPLE 5: PLANNING					
G12	Planning process	Planning process with well-defined objectives, mutually beneficial goals and development priorities, all stated in a long-term integrated basin management plan			
G13	Plan implementation	Implementation of the key phases of the basin management plan			

G14	Decision-making process for the structures	Decision-making process on investments for large structures with a transboundary impact, being consistent with international recommendations in terms of transparency, benefit-sharing and sustainability (poverty alleviation, social and environmental constraints)			
PRINCIPLE 6 : FUNCTIONAL COORDINATION					
G15	Interface between national level and regional level	Design and operation of national relay structures			
G16	Coordination tools	Operation of technical tools for dialogue and joint action plans for basin countries to manage water in a transparent way (water allocation, coordinated management of the structures, etc.)			
G17	Overall reporting mechanism	Mechanisms of the basin organizations to report to government administrators on results obtained through the policies applied			
PRINCIPE 7: INFORMATION SYSTEM AND COMMUNICATION					
G18	Information management system	Shared information system (including geographic component, environmental characterization, etc.) for decision-making support			
G19	Information management protocols	Protocols specifying the type of information needed, how it is presented and the timing of information exchange in the basin organization's information management system			
G20	Communication	Procedures for internal and external communication			

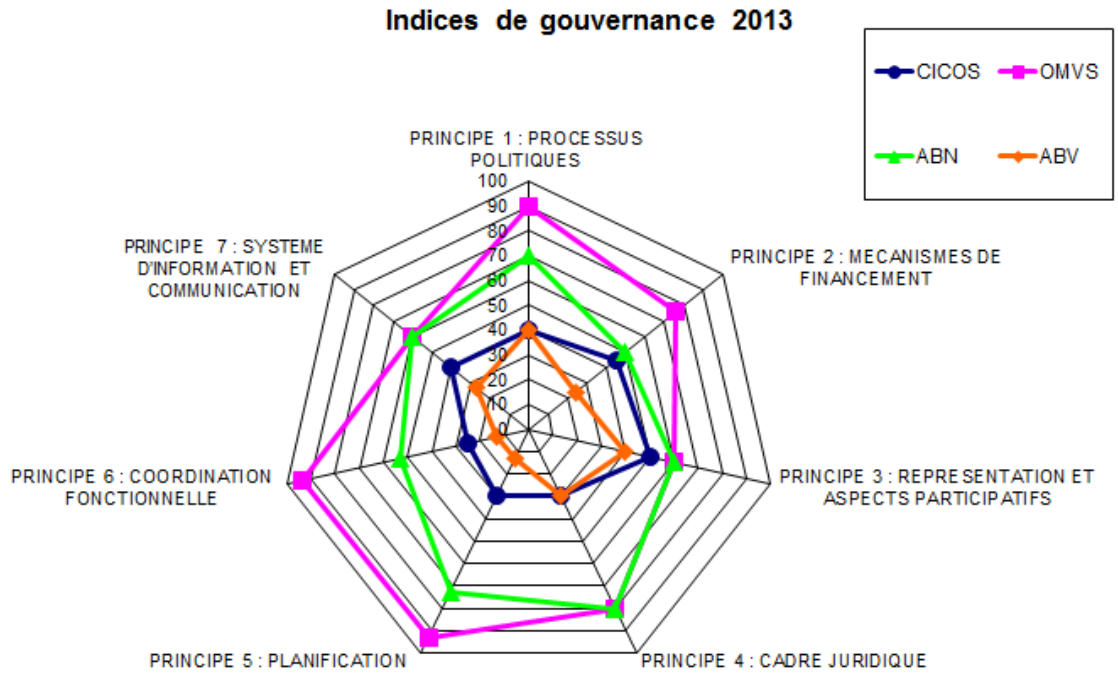
The following diagram shows the results of the seven governance indexes for the four basin organizations involved. This method cannot be used for the WRCC. Since not all of the organizations update the analysis every year[3], the following diagram is based on values given by the basin organizations in 2010.



It is important to specify that the given values come from self-assessments carried out by the organizations, which is the principle of the exercise. Technical staff at the TBOs also undertook these self-assessments, not all of which were validated by the various bodies in each basin. Moreover, this general assessment overview results in "relative distortions" due to their subjectivity.

Taking into account evolutions since 2010, the following diagram suggests the situation in early 2013 (adjustments proposed by IOWater when preparing this document).

[3] For example, VBA uses these indicators as a tool for reporting to the ministerial authorities.



Despite the limitations of such an exercise and the relative subjectivity of self-assessment, this type of diagram shows the potential interest of governance indicators to evaluate the maturity of a transboundary basin organization, and to identify the main points to be developed to improve governance.

2.3.2 *Recommendations on governance*

While the ultimate goal of a transboundary basin organization is to provide the relevant States with suggested methods for joint and effective water management, involving general objectives, the broad range of situations requires adapting the means to achieve this by carefully considering the context and nature of the issues at hand.

(a) Powers and duties of the transboundary basin organization and their implementation

The following recommendations result from a close observation of the operations of the commissions, authorities and structures studied, experience gained in the field of water management at national level, and the practice of international relations.

The functions given to the organization can vary in nature:

- Informative (information system, observation systems - see chapter on monitoring optimization), which is the case of the four organizations studied here. Their implementation is nevertheless often difficult; the operational capability of the OMVS and NBA observation systems could, for example, be improved. The CICOS and VBA information systems are still being developed;
- Advisory to give opinions, suggestions and, whenever appropriate, recommendations. This function is highly dependent on the previous function and on the availability of tools. It is currently only implemented by OMVS and NBA;
- Dialogue and technical coordination on data, studies and projects. The implementation of this task is linked to the institution's maturity and its "recognition". We thus observed several major projects implemented in the Volta and Congo basins with no real involvement from the basin institution;

- Operational (even acting as a contracting authority, which is the case of OMVS only) regarding structures under shared (or joint) responsibility. This function is included in the NBA and VBA mandates but not yet implemented;
- Prevention and conflict resolution, through mediation, arbitration, or even jurisdiction vis-à-vis the parties. The OMVS and NBA charters have been ratified.

The structure may evolve, for example moving from an advisory role to that of contracting authority (currently the case of NBA). This depends on two conditions. It must be firstly authorized by the mandate. Secondly, trust must be established between the member countries and donors. This is a gradual process in which success or failure is not generally due to the mandate.

The territorial jurisdiction of the organization may cover all or part of a river basin and/or of a shared aquifer. The NBA case is interesting if transboundary aquifers are taken into account, since their territory is very different from that of the topographic basin. In all cases, it is advisable that the upstream part of the river basins remains included in the jurisdiction of the organization. Guinea has thus joined OMVS. In contrast, the upstream countries of the Congo Basin are not CICOS members.

The legal status of the organization should be formally defined both considering international law and the national legal order of each country concerned. The internal constitution, as well as the composition of national (and international) representations in selected bodies, is also likely to vary. Thus CICOS does not include a representative body of the Heads of State, unlike the other three organizations. The VBA Heads of State have not met, except for its creation.

Operating rules and procedures should be clearly established: this means defining the preparation of decisions, consultation methods, procedures and the levels for the required financial, technical and political decisions. In addition to internal rules, the organization's relationships with its main external stakeholders should be anticipated, i.e. with international organizations, donors (a committee of the NBA partners was extremely active during the Shared Vision process), non-member countries that might join (e.g. developments are underway in CICOS for the accession of new states), etc.

(b) Citizen involvement in achievements

Modern water management means involving the users. The level at which participation takes place should be clearly defined:

- Either citizens and water users, therefore usually involving millions of people;
- Or through representative structures, relying on national IWRM approaches, which then facilitate representativeness in regional bodies.

The current NBA and OMVS approaches tend to act at national level.

In all cases it is necessary to:

- Plan training for water managers and local technicians on dialogue and listening to users. OMVS did this when developing its master plan. In NBA, the existence of National Coordinating bodies, a Regional Coordination of Users of the Niger Basin's natural resources and collaboration with associations such as "Eau Vive" (which supported the approach since the beginning) make it easier to implement training sessions to build the capacities of water stakeholders.
- Promote people's awareness of the general interest, public good and importance of preserving the quality of water and the environment for the health. The four organizations rarely employ this kind of awareness-raising and communication.
- Adopt a participatory approach to training and education and rely more on local skills and capacities that need to be strengthened accordingly. The resources required should be compared evaluating how much it would cost if local stakeholders didn't assimilate policies.

2.3.3 *Conclusion on governance*

The basin organizations studied have set up a useful dialogue system between the countries concerned. They may also make proposals and recommendations based on studies, but (except for the OMVS) they are not actually in charge of implementing operational responsibilities, although this function may be included in their mandate.

These organizations have been established for an indefinite period, so that they can adapt to changes as they occur. They may undertake studies and research, plan and programme activities, but also promote projects, either on their own initiative or under instructions. They may thus have a significant influence on future developments, which they may be called upon to implement and manage themselves.

The four organizations are likely to play a significant role in the prevention and resolution of existing or potential conflicts. They thus have mediation and arbitration powers regarding water allocation and costs and benefits' sharing for water development projects. The OMVS and NBA charters go even further than international texts (UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes of 1997, for example, which is not yet ratified).

NBA

VBA

WRCC

CICOS

OMVS

OPTIMIZATION OF TRANSBOUNDARY MONITORING

Good practices and recommendations

ANBO

3. Optimization of transboundary monitoring

3.1 Background information on monitoring

This chapter is partly based on the MA3 reference.

3.1.1 *Background and challenges of transboundary data management*

Water resources management in transboundary basins requires organizing the way that information is produced and shared to respond to stakeholders' expectations for the various planning, monitoring, assessment, prevention, warning activities, etc. Managers of transboundary basins must be able to obtain reliable, up-to-date and relevant information when they need it and in a form that suits them. They can then return that information to the countries through derived and processed products.

However, the exchange of information and data on a transboundary basin is often difficult, both for structural reasons (when there is no agreement or protocol between countries for this purpose) and for technical reasons (related to the difficulties of collecting information, harmonizing data formats, definitions, analysis methods, frequency of data collection, the density of monitoring networks and data processing methods). Data and information are often dispersed, heterogeneous, incomplete and rarely comparable or suitable for making objective decisions. Many public, para-public or private organizations produce and manage data, but they often do not have the means or the guidance documents needed for exchanging, gathering, standardizing, summarizing and compiling the data they and others producers possess.

In addition, national authorities may also be reluctant to provide information, considered as strategic, to neighbouring countries, especially in a context of scarce resources.

The transboundary basin organization provides a proper framework for basin-related data management, which is often one of the pillars of its mandate.

Basin organizations are faced with two major challenges:

1- Building sustainable capacities to produce the data required for water resources management, taking into account production costs, which can be high;
2- Developing procedures, tools and methods to enhance the value of the existing data to meet the information expectations of the public and decision-makers.

3.1.2 *Overall methodology for developing transboundary information systems*

(a) Assessment of the situation – Analysis of requirements and existing circumstances

The assessment phase involves making an inventory of existing data that includes analyzing information and their access conditions. A list should be made of data and information requirements expressed by the main partners according to their role and level of intervention (national, basin, regional).

➢ Analysis of the legislative and institutional situation

Given the range of issues to be addressed and the number of organizations producing data at regional, national and local levels, it is advisable to make a prior analysis of the legislative and institutional situation of data management, supplemented by an inventory of the stakeholders – data producers, managers and users.

This involves highlighting:

- the roles and responsibilities of key stakeholders regarding data production and management at regional, national and local levels;
- current projects on data management and sharing;
- existing procedures and obligations in terms of production, management and dissemination.

➢ Joint inventory of collection arrangements and existing data sources

An inventory of collection methods and existing data sources is essential to:

- identify existing datasets (paper or digital datasets) and analyze their level of accessibility;
- check that the quality of existing datasets matches users' needs and requirements;
- organize, when necessary, additional requirements and rules on data production, sharing and access to future data.

This inventory of data sources requires cooperation with data producers and managers. In order to respect individual partners' roles, each producer and manager should be able to describe the datasets it produces or manages.

After organizing a framework for collaboration with the various partners, a catalogue of data sources (metadata) can be made available on the Internet to facilitate this collaborative work. These catalogues thus allow:

- partners to directly integrate the data they manage;
- users to identify and download data through user-friendly interfaces.

It have to be noticed that the aim here is not to collect data but to make an inventory (an instant snapshot) describing data characteristics: who produces the data, their form (format, geographic projection, scale, etc.), the conditions under which data are produced or made available (including confidentiality rules), existing information determined by the producers, etc.

➢ Analysis of existing data flows between the partners

Diagrams can be developed to describe the existing flows of information between various partners at national and regional levels, on the main IWRM topics, including the following data:

- meteorological (rainfall, temperature);
- hydrological;
- on the quality of surface waters and information on the sources of pollution;
- environmental (ecosystems, wetlands);
- on groundwater;
- on water uses and abstractions;
- sociological and sanitary;
- on the administrative and economic situation.

Here too, it is advisable to organize the flow analysis through a collaborative approach with partners, for example by organizing national and regional workshops.

- **Enquiries to assess users' information requirements**

Information requirements usually include:

- status of water resources in quantity and quality, including meteorological information and water levels;
- uses and demand (drinking water supply and sanitation, irrigation, hydropower, fishing, recreational activities, etc.) and associated developments and their impacts on water resources and ecosystem functions;
- problems (floods, sedimentation, salinization, pollution, drought, etc.) and solutions to deal with them;
- measures taken to solve the problems and improve the use or functioning of the watercourse.

It also involves analyzing partner requirements in terms of:

- production of (raw and processed) data;
- hardware and software for data collection, transfer, storage and processing;
- service for hosting/processing data and disseminating information;
- topographic base (catchment area, rivers, uses, etc.);
- training for technical capacity building.

(b) Action plan related to water data

Based on the results of the assessment, a comprehensive multi-year action plan can be defined and discussed with the regional and national authorities to meet the identified major needs. The action plan summarizes the current situation and priority targets and lists recommended actions, both organizational and technical, to improve data production and management while defining priorities to achieve national and basin objectives.

The action plan for data monitoring and management, which is itself a part of the basin organization's overall action plan (see chapter on Strategic planning), can be used to establish synergies with actions set up and funded elsewhere, and thus avoid duplicating activities.

(c) Implementation of the action plan

Information systems are tools used to ease the production and sharing of information expected by country partners. Their development requires to involve working on both institutional, organizational and governance issues (see corresponding chapters) and technical issues.

A **step-by-step approach** is recommended to perform the best use of available resources and knowledge. This can begin with informal cooperation between countries at operational level, and then be developed into more formal agreements that range from modest goals to more ambitious ones. A step-by-step approach can also be used to assess cost-effectiveness, realize a careful analysis of requirements, and combine monitoring and modelling.

For transboundary waters, raw data are usually acquired at national level rather than by special systems created and operated by the transboundary basin organization. The data are transmitted to it; each country can of course also manage its own national information system.

The platform of the transboundary basin organization's information system (i.e. servers, software) shall, as far as possible, be constructed from the existing infrastructure of each national partner. This platform should be able of managing all kinds of information: geographical, alphanumeric, texts and multimedia. Its main components are usually:

- a database and a geographic information system (GIS);
- tools for online management of metadata catalogues;
- a web portal for sharing and dissemination the information;
- modelling and decision-making support tools (see chapter on Strategic planning).

For information purposes, activities related to the development of an information system may include:

➢ Development of common rules for data sharing

Any exchange of data assumes a definition of common rules for sharing (general principles on the rights of access and use, compliance with the rules of confidentiality defined with the producers, etc.), and, on a case-by-case basis, exchange scenarios (who exchanges what, with whom, for what purpose, how often, what format, etc.).

It usually leads to the signing of memoranda of understanding between the key organizations concerned to formalize these rules and organize data collection.

➢ Development of semantic interoperability

Sharing of data and information is only useful if the data are comparable and homogeneous. This therefore requires checking the comparability of data and possibly clarifying the concepts, definitions, coding systems, units and common calculation methods to be used when exchanging information.

In the case of non-homogeneous data sources, the definition of a common language may require:

- a detailed analysis of the concepts, definitions, codes and calculation methods used by each partner;
- the adoption of a common frame of reference for exchanges with the definition of a common model (conceptual diagram, common definitions and codifications).

➢ Development of technical interoperability

Along with semantic homogeneity, it should be ensured that the information systems that manage data - made available by the partners - can communicate with minimum human intervention, while respecting the exchange scenarios adopted. Strengthening this technical interoperability of information systems begins with the definition of architecture for networking services, or for centralizing information. This reinforcement should be done as much as possible by relying on existing information systems at the various partners.

➢ Human resource development

A basin's information system requires qualified personnel to operate it. A capacity building program can thus include:

- general training on the administration of environmental data;
- general technical training;
- training on specific methods and tools related to the administration of water data at national and regional levels.

3.1.3 *World Hydrological Cycle Observing System(WHYCOS)*

WHYCOS is a WMO program which aims at improving observations, strengthening international cooperation and promoting the free exchange of data on **hydrology**. The program is implemented through various HYCOS components, particularly in transboundary basins.

WHYCOS promotes a bottom-up approach, going from requirements at national, basin or regional level up to global level. WHYCOS and its components aim primarily at targeting the technical and institutional capacity building of **National Hydrological Services** (NHS) and at improving their cooperation in managing shared resources.

The main objectives of WHYCOS are:

1- building the technical, human and institutional capacities of States' NHSs;
2- promoting regional and international cooperation in sharing hydrological data and in managing shared water resources;
3- Easing adaptation to impacts of climate variability and climate change.

3.1.4 *Basins' environmental observation systems*

This kind of observation system aims to measure and monitor environmental changes, in order to provide information for decision making and develop a shared vision in transboundary basins. The implementation steps of these observation systems are described below.

1. Technical aspects:
   a. assessment of requirements for information and data related to development issues in the basin,
   b. monitoring indicators are defined and existing monitoring systems evaluated,
   c. impact assessment of existing developments are identified and baseline indicators established,
   d. the environmental observation system is established. Studies and work for the optimal operation of existing monitoring systems have been completed; different monitoring systems have been networked.

2. Institutional aspects:
   a. consultation and dialogue between the beneficiaries of the tool - basin authority, managers of national sub-basin agencies, Non-Governmental Organizations, governments, civil society, private sector, researchers and users in the basin,
   b. creation of an environmental observation system,
   c. establishment of a network of partners involved and motivated by the mutual interest of feeding the observation system with data.

3. Capacity building / training:
   a. on environmental information systems and Geographic Information Systems,
   b. methodological support for improving existing monitoring systems.

4. Communication:
   a. two-way, from the network partners to the observation system and conversely,
   b. broad dissemination of the collected information.

5. Financing: thought process on financing the operation of the observation system, which is a condition for this tool's sustainability.

3.1.5 *Climate change and risks*

Controlling water-related hazards is even more relevant in the context of **climate change,** which is likely to increase frequency of extreme phenomena. It is important for countries to share information, especially hydro-meteorological data, and to achieve progress in sectoral plans, e.g. combating the impacts of climate change, management plans for droughts and floods.

Flood risks are identified through maps that include hazards and vulnerability. Specific rules for construction in these areas should be developed and the definition of protection measures should be implemented. It is also important to develop a **forecasting system** that can anticipate and warn people when a weather episode might lead to flooding. The specificity of transboundary basins lies in the complexity of the system to be developed.

The system must be closely operated with Member States and specialized national water agencies. Fed by meteorological and hydrological data, the system can calculate the evolution of flows in the basin and therefore the water levels in rivers. Signals relative to forecasts should be addressed to the governments that are responsible for protecting people and their properties.

Each phenomenon needs to **be assessed** in order to learn lessons and modify procedures when necessary. This is particularly important in the case of extreme phenomena, which occur only after a long interval (about a century), but whose frequency can increase due to climate change.

3.2 Monitoring practices used in basin organizations

3.2.1 *Hydrological monitoring and WHYCOS program*

The NBA makes a distinction between hydrological monitoring, which is the focus of the Niger HYCOS project (directly supervised by the Technical Department), and monitoring of other parameters using the Niger Basin Observation System (complementary to the technical department but directly supervised by the NBA Executive Secretary). The Niger HYCOS project started in April 2005 with AFD and AWF support; it followed the HYDRONIGER program, which started in 1980, and was implemented by the NBA and the National Hydrological Services of its nine member countries.

The observation points are made up of 105 hydrometric stations, including 45 automatic data collection platforms. We note that despite the different financial resources received since 2005 (AFD, AWF) only a limited number of stations (less than one third) are currently in operation. According to bibliographic reference MA2 ("9th WIAG meeting Geneva, Switzerland. Draft Report", WMO 2011), the main concerns relate to the operation and maintenance of the stations[4]. Indeed, the NBA member countries clearly perceive these concerns through:
- Resolution No. 1 of the 23rd Ordinary Session of the NBA Council of Ministers held in Cotonou in September 2004, on the securing and maintenance of data collection equipment;
- Resolution No. 11 of the 28th Ordinary Session of the Council of Ministers, held in Cotonou in September 2009, on the continuation of the Niger -HYCOS Project;

[4] Some countries wrongly perceive them as being NBA property.

- Resolution No. 12 of the 30th Ordinary Session of the Council of Ministers, held in Ndjamena in September 2011, on the effective and sustainable operation of the hydrological monitoring of the Niger Basin.

Hydrological bulletins are produced monthly and widely disseminated.

NBA has historically worked in the field of hydrology with AGRHYMET regional center (with which it shares land) and with the ACMAD continental center. Prospects for applying spatial hydrology (direct measurements of water levels by satellite) are under study with the Netherlands.

*

We notice the following progress in the development of the Volta HYCOS project (included in the observation system), financed by France and coordinated with the Niger-HYCOS project (4 common countries):

- in December 2009, transfer of the Volta HYCOS server from the IRD (Research and Development Institute) center in Ouagadougou to the VBA . Constitution of a 2000-2007 historical base;
- rehabilitation and installation of stations in the Member States;
- equipment purchasing process;
- development of hydrological products using spatial modelling and analysis in collaboration with 2iE (International Institute of Water and Environmental Engineering);
- development of hydrological bulletins in January 2010;
- purchase of HYDROMET software;
- drafting of a protocol for the exchange of hydrological data with Member States (signing of Togo and Benin).

Phase 2 of the Volta-HYCOS project is being initiated. However, we notice insufficient human resources; the project team in the NBA Executive Department lacks of staff (hydrologists in particular). Several dozen DCP-type automatic stations are waiting for installation.

*

The Congo-HYCOS project, implemented by CICOS, started at the end of 2012. The activities planned in 2013 with FFEM funding were as follows:

- Establishment of the institutional framework - Agreements with the countries and institutions, i.e. the data owners, for the provision and use of these data;
- Selection and recruitment of the project's regional coordinator;
- Detailed assessment of the condition of the existing hydrological network - standards, requirements for rehabilitation and maintenance of existing stations, specifications for the revision of stations and acquisition of new equipment;
- Definition of detailed activity plan and budget estimation.

We note that several DCP-type automatic stations, acquired in previous projects, are not yet installed.

Training related to the Congo-HYCOS project started in 2012 and is implemented by IOWater and CICOS, with funding from the ACP-EU Water Facility.

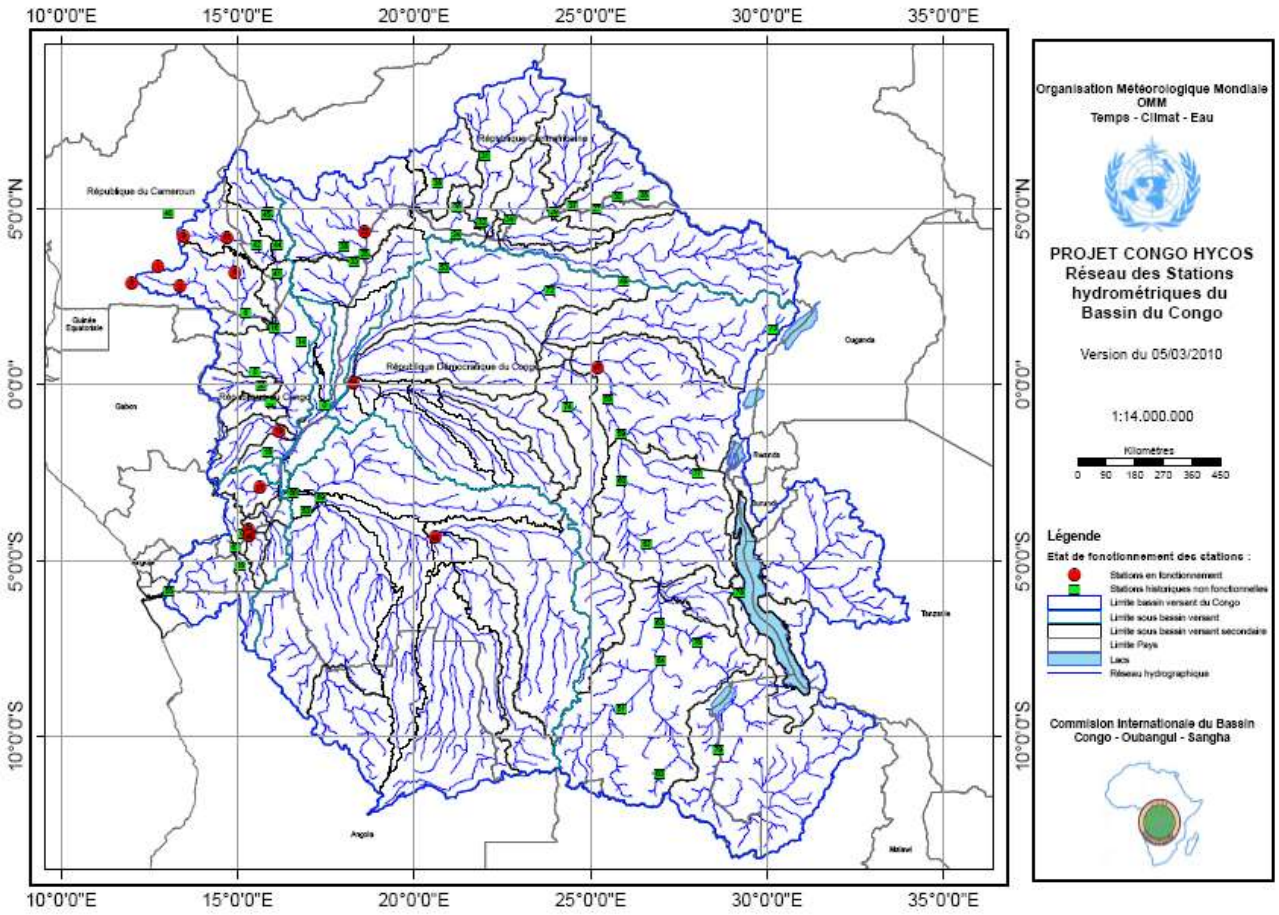


Figure 6: Hydrometric stations in the Congo basin

The African Monitoring of the Environment for Sustainable Development Program (**AMESD**), developed from 2007 to 2012 with European funding, includes the management of data from satellite imagery, including hydrological measurements. This project works in particular with the research sector (IRD) and occurs in Central Africa through CICOS. The Congo-HYCOS project will be thus the first of the WHYCOS projects to integrate space hydrology through "virtual" hydrometric stations (35 have been identified).

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The Senegal HYCOS project is under preparation in collaboration with WMO.

In addition, OMVS also established a needs/resources **Management Chart**.

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Since 2006, the Mekong River Commission (MRC) has been developing the **Mekong-HYCOS** project supported by AFD (French Development Agency) and FFEM. In April 2012, the MRC conducted a final assessment of the project. Its main conclusions are outlined below:

- Priority should be given to the management of data on flows rather than on water levels. Historical and real-time databases (automatic transmission by GSM network) could be integrated to produce a dataset. A single software program could be used by both MRC and its member countries;

- The network of stations could be progressively optimized; conventional hydrometric stations (without real-time transmission) could be integrated in addition to the automatic stations;
- "Customized" technical assistance could be provided. MRC key project staff should be recruited permanently;
- Links between national hydrological services and data users could be strengthened.

3.2.2 *Basin observation and information systems*

The assignment of the Niger Basin Observation System, directly supervised by the NBA Executive Secretary, is to follow changes in the basin's hydrological, environmental and socio-economic aspects. It aims to monitor the basin and periodically produce and disseminate information. It has been operational since 2006. Its main achievements are:

- Baseline Study on making the observation system operational;
- List of 28 priority (environmental and socio-economic) indicators and their specifications;
- An Environmental Information System (EIS) with a web interface;
- Standardized technical procedures for data and information management;
- An inventory of environmental and socio-economic data from both NBA (Programs and Projects) and technical and scientific partners (CR-AGRHYMET, ACMAD, etc.) and from public and para-public institutions of the NBA Member States;
- GIS platform and baseline of 24/28 indicators;
- Development Plan for the Niger Basin Observation System, together with a finance plan up to 2027 totaling 7.9 billion FCFA or 12 million euro.

The observation system has recently been audited by the FFEM (French Global Environment Facility), which funded it. The main lessons learned are:

- the smooth running of the observation system's activities is closely linked to the NBA National Focal Structures, whose role is to be consolidated;
- the constraints and main difficulties encountered concern the procedures for data acquisition, the low reactivity of the national data producers, and insufficient internal funds to sustain activities.
- The Development Plan requires a high level of external funding, i.e. 90% of 12 million euro over 15 years.

The observation system has met resource problems since FFEM funding stopped. The Development Plan is being revised downwards.

Projects on the reversal of trends in land and water degradation in the Niger River Basin (GEF funding), on the protection against water-related erosion and on silting control in the Niger River Basin (ADB financing) both managed a large number of data within the NBA up to 2011. The databases and GIS of these two projects were handed over to the Niger Basin observation system. The latter also manages the planning, monitoring and assessment software of the program on water resources development and sustainable management of ecosystems in the Niger River Basin (World Bank funding).

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According to the VBA's mandates, the project on the observation system for water resources and associated environments focuses on:

1. supporting VBA by providing an operational multi-sectoral tool;
2. allowing the VBA to perform an assessment of water resources and requirements, and the environmental situation in the basin; developing an information and communication tool;
3. contributing to decision-making to define priorities and options for sustainable basin management and to anticipate the negative impacts of water management.

In this perspective, the project has three components:

- Component 1 - Assessment of the basin's environmental situation;
- Component 2 - Development of the observation system;
- Component 3 - Involvement of stakeholders in water and environmental management.

Figure 7: Homepage of the descriptive application of VBA hydro-meteorological networks

Component 2 has not yet been completed. Regarding component 1, a meta-database of the hydro-meteorological networks and an atlas of thematic maps on the Volta basin have been published online. A study of the environmental and socio-economic situation is underway. The observation system's network, including civil society, is still being established.

The VBA Activity Report for 2010-2011 makes the following recommendations:
i. continue the process of recruiting staff for the Observation System (only its Director is currently in position, a data processing specialist is being recruited);
ii. resubmit data sharing protocols to Member States;
iii. initiate the establishment of national focal structures in each Member State.

The study on the establishment of a regional system for exchange of information and data related to the Volta basin (MV3) funded by GEF, gives the following recommendations:

- Support is needed to organize the national structures which have been identified;
- The observation system should serve as a focal point for international programs regarding data and information on the basin;
- The observation system could rely on thematic committees or working groups that would study the procedures, norms and standards for collecting and processing environmental data;

- Harmonization of the tools used for the collection, processing and dissemination of information at basin level is highly recommended.

Under another project (**GLOWA-Volta**), the geo-portal and collected data were transferred to VBA in November 2010. A workshop on forecasting the start of the rainy season was held under this project.

*

An essential component of the WRCC Strategic Plan for 2007-2015 is the establishment of a **regional water observation system**. This aims at strengthening water information systems in individual countries, encouraging compatibility of information obtained at national level, summarizing information at regional level, and making it available to interested partners by:

- making comparative analyses on how IWRM general principles are adapted and applied in countries and river basins;
- supplying a base of concise information on experience at regional level to give partners access to best practices and help them identify benchmarking areas;
- building up a regional management chart showing progress made in IWRM implementation.

As part of the regional water observation system, information sources and items to help define the specifications of a Regional Water Atlas of ECOWAS were identified in 2006 in MO1. The Atlas of regional water resources in West Africa (MO2) was completed in 2010.

The process of setting up the WRCC observation system is underway with the support of the African Water Facility. One of its main obstacles is the lack of internal human resources.

*

The Information System of the Congo Basin (SIBCO) was established in CICOS in 2007, with funding from GIZ (GETRACO project), but it is suffering a responsibility issue because it was not planned in the organization chart. The SIBCO includes in particular:

- A computerized register of the boat fleet and statistics related to river ports, accidents and incidents ("Observation system of transport facilitation");
- A catalogue and map of the dams;
- A Hydrological Information System (HIS) is being developed.

A Memorandum of Understanding (general) on exchange was signed by three countries.

*

In 2000, OMVS started a process for the establishment of an Environmental Observation System with support of the FFEM. The reference MS1 report collects the Technical Notes of the Observation system on the monitoring and assessment of the status of the environment in the basin. For each thematic network, this computerized tool that can manage stakeholders, the processed information, the information flows between stakeholders and the processing of this information broken down into actions.

The system is operational and can generate, among other things, thematic maps of the assessment in time and in space. A report on the status of the environment in the Senegal River Basin was published in 2011, thanks to an analysis of the data collected in the states.

Formerly directly supervised by the High Commissioner, in 2010 the observation system was integrated into the Department of the Environment and Sustainable Development during the institutional reform of OMVS. The OMVS established a health monitoring system in 2010 with the support of the World Health Organization, the World Bank and AFD. The MS2 report reviews the detailed arrangements of this establishment; a Handbook of Procedures was drafted (MS3) and the first Annual Report was produced.

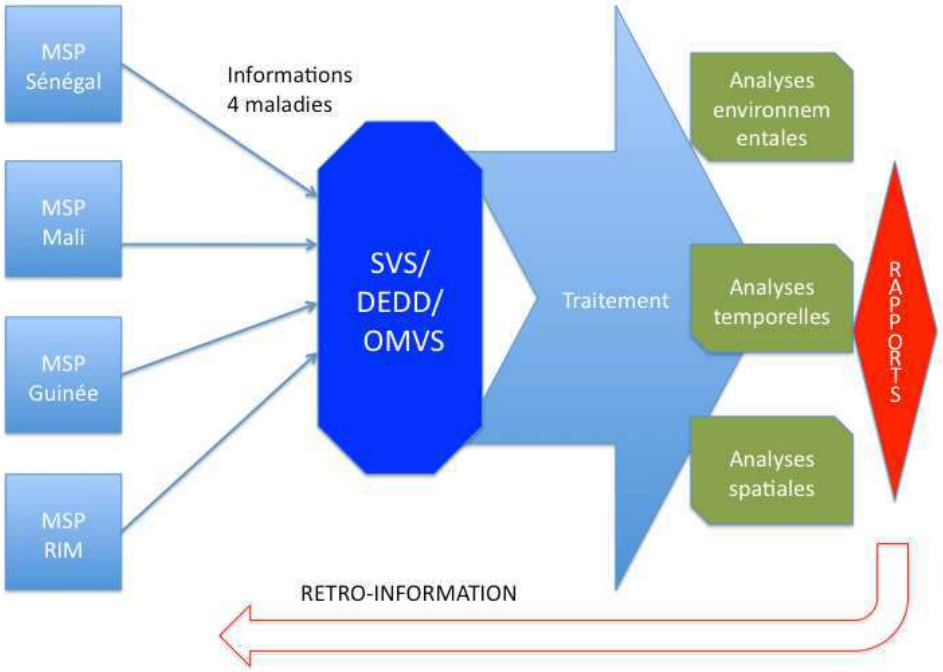


Figure 8: OMVS health monitoring system

A component on water quality is being developed.

3.2.3 *Climate hazards*

The largest decreases (from 30% to 50%) in the flows of the Niger River and more generally of West African watercourses since the 1970s are attributed to climate change. An increase in the frequency of extreme phenomena is also likely happening in the future.

The NBA Heads of State raised questions in 2008 on the additional risks associated with climate change when implementing the Action Plan for the Sustainable Development of the Niger River Basin. With support from the World Bank, IPCC (Intergovernmental Panel on Climate Change) simulation scenarios were carried out in collaboration with the AGRHYMET regional center of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS). According to the MN5 reference:

- The rainfall results simulated by global models differ significantly (from -20% to +15%). Additional calculations are needed;
- The implementation of the NBA action plan for sustainable development is by itself a response to the possible negative impacts of climate change in the Niger Basin;
- The Fomi Dam would play an important regulating role on the mainstream of the Niger River and its construction process should be accelerated, with changes in its project management;

- In addition to the structures planned in the APSD, the development of reservoir and run-of-river dams would respectively increase low water flow rates and compensate energy losses;
- The potential for developing the Bénoué sub-basin should be promoted;
- Adequate measures must be taken to improve rain-fed crops because of their vulnerability to climate change and their importance in food security.

We notice that OMVS is carrying out a study on the impacts of climate change on the Senegal River basin.

3.2.4 *Hydrological forecasting tools*

The NBA Computerized Forecasting System (SIP), which started operating in 2011 and was upgraded in 2012 thanks to AFD funding, is managed by the Niger Basin Observation System. It includes a set of models for predicting flows in 38 stations on the Niger Basin (part of the 105 Niger HYCOS stations). NBA's role is limited to developing forecasts, transmitting the results to countries and warning them, with countries being responsible for taking necessary measures.

The report on MN4 reference concludes:

- In case of floods, the lack (or insufficient quality) of basic data on the Lower Niger makes it impossible to make forecasts on all sites facing challenges. Forecasting dam water releases downstream would improve the forecasting model. Forecasting on the Bénoué is biased by errors due to a lack of information on intermediate inputs. Another problem lies with the weak forecast horizons on the upper part of the Niger;
- Trends in low water levels can be forecast but uncertainties on low water flows influence results. If influenced by dams, corrections are sometimes possible when data are available;
- Trend models provide valuable information for managing water resources, especially for the Kandadji, Kainji and Jebba dams;
- In general, the need to review raw information was highlighted. There are also many gaps in the datasets including in some synoptic stations.

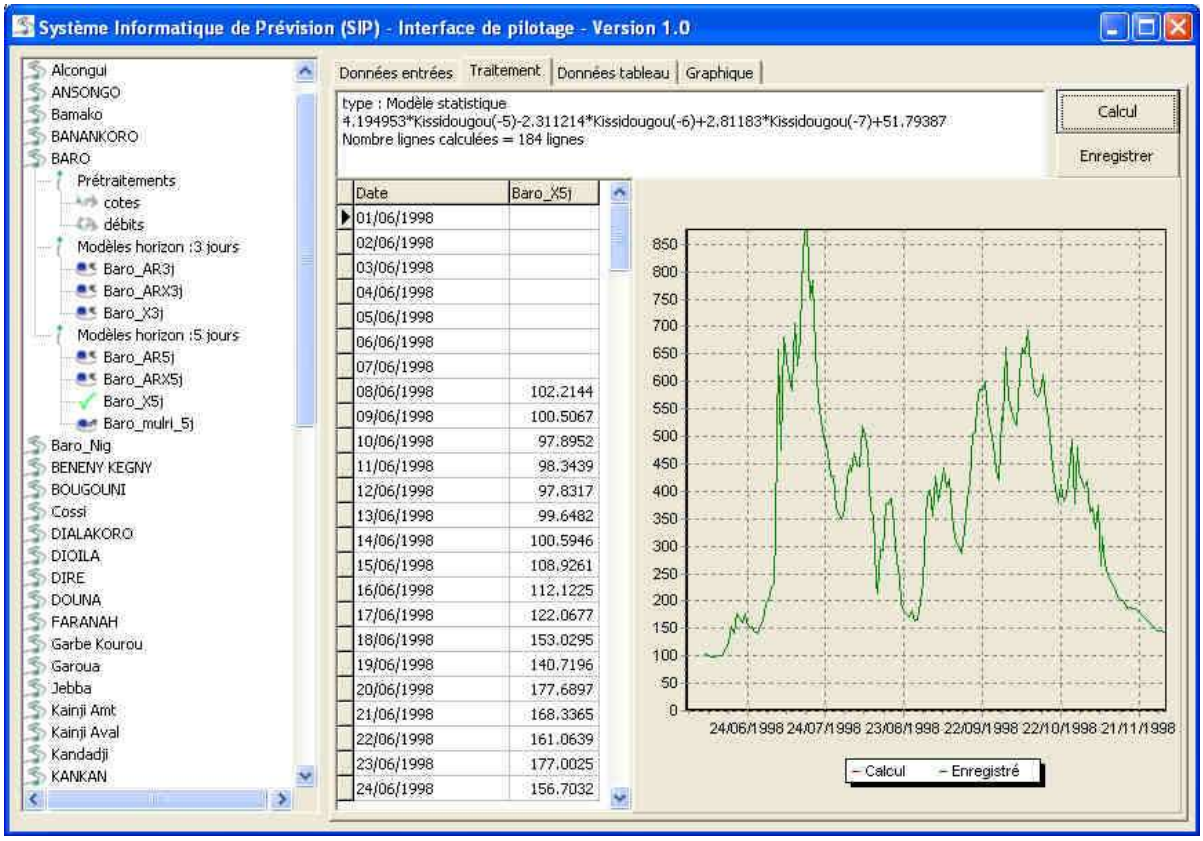


Figure 9: NBA's SIP driving interface

In addition, CICOS has developed a forecasting model for water levels on the Ubangi River as part of the AMESD project.

OMVS carries out seasonal forecasts, as does ACMAD at African regional level.

3.3 Overview and recommendations related to monitoring

The table below gives a qualitative overview of the practices used in information management by the organizations studied.

Summary table of information management practices

Institution	+++ operational ++ advanced + started - not started			
	Hydrological monitoring and WHYCOS	Exchange of information	Observation system and regional GIS	Climate change and hazards
NBA	++	++	++	+
VBA	+	+	+	-
WRCC		+	+	
CICOS	+	+	+	-
OMVS	++	++	++	+

The following recommendations were partly established following an e-forum organized with basin organizations and partners from 10 September to 8 October 2012 (see appended summary).

General recommendations on monitoring

General recommendations are as follows:

- Monitoring, along with planning, is one of the **essential functions** of basin organization. The main emphasis should be on hydrologic monitoring (manage what you know);
- The **institutional framework** for coordinating data management activities should be established and validated by the parties involved. The basin organization is the consensual framework for participation and cooperation between Member States to manage resources efficiently;
- Information systems can be progressively developed **in stages**. A first version of the system can be put in place rapidly, even if initially it will only concern a limited number of parameters: the aim is to avoid over-restrictive bureaucracy and remain aware of needs to keep the system operational;
- The information system should be managed by **permanent, competent staff** working for and within the organization;
- Even when externally funded projects support the information system to start with (i.e. its creation and kick-off), a precise timetable is required to ensure that it lasts. This should be drawn up in coordination with all partners and ultimately **operate autonomously**. Only one information system should exist within the basin organization (and also in countries on a given theme, e.g. hydrology), since individual projects cannot manage in parallel, superfluous systems;

- To ensure long-term monitoring, a basin organization's internal funding should concern not only the staff who manage the information system, but also the collection and **operating costs** of the system itself and its equipment, which can be significant.

Data acquisition and management

The recommendations on data are as follows:

- Knowledge of data on current and future water **usage and consumption** is necessary, as well as on existing and planned major developments and facilities. For these developments, other data are essential, such as on ecosystems (green infrastructure), displaced populations, and health (water-borne diseases);

- The "added value" that the basin organization generates through integrating data - supplied by countries - into the information system must be clearly established and proven. This may in particular involve derived **applications** of data, such as aiding decisions on major infrastructures (cf. chapter on planning), or flood warnings. This will facilitate **data provision** ("win-win" process), as well as countries' financial contributions to operating the system (or even to the basin organization itself, cf. chapter on funding).

- The efficient operation of a transboundary basin organization's monitoring activities is closely linked to those of the **national structures** that represent it, since they play a fundamental role of relay with national data producers.
  Sharing data between countries should obviously be advantageous to national stakeholders themselves in order to motivate them over time. Basin organizations should be capable of leading focal point teams by e.g. providing them with training opportunities and chances to present results during workshops, sharing tools developed at basin level (e.g. hydrological models), inviting national partners to visit concrete achievements, etc. This sharing should be devised as a two-way process: the basin organization shares what it has collected and analyzed, and the countries share their own information in real-time, including those on projects that impact water resources; each party thus enjoys benefits (win-win) and recognition;

- Following on initial informal exchanges with countries, bi- and multilateral protocols should clearly set out for **data exchange** procedures, their use by basin organizations, and derived products.
  The choice of parameters used in the transboundary information system should be made with riparian countries, knowing that definitions are frequently the subject of disagreement between countries (and sometimes even within the same country). Basin organizations can capitalize on methods and useful scientific and technical aspects, both national and local, and extend them to basin level within one of the thematic networks on their information systems;

- **Communication** tools can vary depending on the case. For example, bulletins may be sent out (daily, weekly or monthly, on the Internet or paper) to inform stakeholders, including inhabitants. The crucial factors are the level at which communication takes place (decentralization), appropriate terms (avoid technical jargon), an instructive approach, and the language (including vernacular language).

Practices specific to HYCOS projects

We noticed the following points regarding projects of the WHYCOS program:

- The regional management team (regional center or other) within the basin organization should consist of a permanent team of sufficient size, including a manager and full-time staff (coordinator, computer expert, hardware technician, etc.) or temporary staff (hydrologist, database specialist, hardware maintenance technician, information system technicians, etc.);
- When a basin organization does not yet possess the required personnel (hardware installation and maintenance in particular), another basin organization may be called on for help;
- This means ensuring proper **familiarization** with hardware for the acquisition of data, which belong to the countries. Vandalism is recurrent but solutions are gradually being introduced. The IRD estimates the average cost of a hydrometric station at about USD 2,500/year;
- A basin organization is not meant to replace states, but can support them in the management and maintenance of stations, at least the main ones (synoptic stations), through "service delegation";
- New **spatial hydrology** technologies (direct measurement of water levels by satellite) are now sufficiently mature to be integrated into projects. Used alongside conventional ground stations, they can generate substantial benefits when conditions allow;
- **Automatic transmission** of data in "real time" can successfully be carried out by GSM telephone network (mobile phone, where coverage exists, which is often the case), which is cheaper than satellite transmission;
- WMO Resolutions 40 (CG-XII) and 25 (CG-XIII) propose rules for **exchanging data** and products (applications) relating to water between countries;
- The process of producing and validating data in a hydrological information system comprises five steps (according to WMO): data acquisition (historic, measurements) - processing and validation of data on water levels – development of a calibration curve – calculation of flow and validation, including metadata (gauging, etc.) – quality control. Data should be managed using specific software for these various stages. When developing or choosing a system, working with hydrological experts and computer analysts is highly recommended;
- Communication tools should be carefully constructed. Hydrological bulletins can be developed in addition to a web portal;
- The average **duration** of a HYCOS project is about 10 years, the gradual withdrawal of external funding should be planned at this time;
- Partnerships with the **private sector** (hydropower, mining, oil, etc.) may be considered for funding hydrological monitoring;
- Difficulties are sometimes encountered with the different organizational positioning between some HYCOS projects and **basin observation** or information systems. A clear and coherent choice should be made regarding the respective roles of the different systems to avoid duplication and red tape;
- Monitoring should start by looking at the **quantitative aspects** of water resources and then their qualitative aspects. For sedimentology, collaboration with scientific partners is essential;
- Basin organizations' monitoring of surface waters should quickly be extended to **acquifer systems**, which are often less well known. When they exist, collaboration with the organizations responsible for their management (Sahara and Sahel Observatory) is indispensable;

- **Rainfall monitoring** requires a broader, more representative network (i.e. entire catchment area) than for hydrometric stations (which are limited to waterway networks).

Derived tools

The following points relate to applications:

- Developing **models** to forecast extreme events (e.g. floods, droughts) or for simulation (allocation, forecast), often requires significant efforts to review settings data. To constantly improve their performance, these tools should be regularly updated to reflect the basin's hydrological situation;
- In addition to the basin organization's internal capacities, additional highly specialized skills may occasionally be taken on in the fields of metrology, data processing, databases and information systems, involving specific **technical expertise**, training, or software development. A service providing contract and "customized" technical assistance may be considered;
- **Satellite images** may be very useful, especially for checking data with few information or measurements;
- Collaboration with the **research** sector is advisable, for instance in the field of climate change. We note that some research projects are not always carried out in synergy with the basin organization.

Climate change

It is essential to monitor the impacts of climate change on water resources. Monitoring can be used to establish different strategies for adapting to climate change depending on the flow regime of watercourses or aquifers:

- Adaptation depends on knowing about and anticipating phenomena. It is necessary to use hydrological basin models developed by downscaling input data from global models of the Intergovernmental Panel on Climate Change (IPCC), although their high level of uncertainty still needs to be mastered;
- Connections between **water, energy and food security** are crucial (e.g. via large hydraulic infrastructures), along with connections between water and forests;
- Transboundary basin organizations help **raise awareness** of the impacts of climate change on water resources among decision-makers and hence the need for monitoring.

Conclusion on monitoring

The role of transboundary organizations is to collect (via countries), analyze, and then summarize often complex data with the aim of making collective decisions that may be immediate (e.g. flood warnings, pollution), on mid-term (abstraction authorizations), or on long term (creation of new major hydraulic infrastructures). As a result, basin organizations should be able to analyze data, check their reliability, use them to describe the basin's situation and developments as accurately as possible, and then disseminate this information to Member States ("win-win" process).

Transboundary basin organizations thus act as an information exchange platform between countries in the basin, ideally with an information access for civil society. When the data collected is used efficiently, it can serve in investment choices, the management of hydraulic structures, allocation of resources, prevention of floods and droughts, and adaption to climate change. The quality and performance of this kind of tool depends on the reliability of the database. Each Member State is responsible for making the best use of information provided by these tools to implement appropriate actions, often jointly with other countries, thus once again through the basin organization. Thanks to internal skills, basin organizations can thus present themselves as a true "skills center" available for countries, users and anyone who needs them, adding real value to the data provided by the countries.

However, the lack in sharing of data is often a real problem. Although transboundary basin organizations should play a role in centralizing data, data-collecting countries often face real issues for internal funding and data collection resources. Facilitating the sharing of data lies mainly in the solution to this problem.. This involves in particular a special emphasis on developing data, and making decision-makers aware of the need for funding data collection.

NBA

VBA

WRCC

CICOS

OMVS

STRATEGIC PLANNING

Good practices and recommendations

ANBO

4. Strategic planning

4.1 General information on planning

Planning action on a transboundary basin can take different forms. It should comprise components covering:

- Long term (15 to 30 years) – strategic action plan, master plan for water development and management, management plan, etc.;
- Short term (2 to 7 years) –actions plan in the form of a programme of measures or a detailed investment programme, including structural measures (also meeting environmental objectives like maintaining ecological functions) and non-structural objectives (e.g. linked to governance).

The existence of a propitious international institutional environment is a prerequisite to all transboundary strategic planning, supplemented by a legal framework (cf. chapter on governance).

Planning involves two stages:

- Diagnosis of the current situation;
- Definition of actions and future projection.

4.1.1 *Diagnosis and planning tools*

Transboundary diagnosis

The first planning stage involves carrying out a status report, inventorying problems and identifying strong points. This may include an evaluation matrix cross referencing the different themes by country. The diagnosis should be shared by countries and water stakeholders, which involves effective sharing knowledge and data (cf. chapter on monitoring) and suitable governance (cf. chapter on governance).

The diagnosis supplies the basis for drawing up an action plan. It is part of a stakeholder engagement process that starts with the preparatory stages and ends with putting in place potential solutions when formulating the action plan. Crucial components of the process include identifying stakeholders, consultations and studies of institutional capacity, governance and investment.

The diagnosis should not only cover the state of water resources and related ecosystems, but also activities that impact or are likely to impact these resources. It should include a current and prospective vision of the territory concerned, for example factors likely to create pressure on water resource, such as a population increase leading to additional consumption, greater volumes of wastewater, urbanization, agriculture, infrastructure, risks linked to climate change, and managing the demand and water volumes. The development of this prospective vision may involve drawing up trend scenarios for the different economic sectors that generate pressure.

A prospective vision that characterizes and identifies problems can then be used to define targets and rank priorities, for example by homogeneous development zones, each of which could correspond to several countries. In addition to a diagnosis of the current situation, such a prospective approach allows then to establish different scenarios and compare them in order to draw up an action plan.

Planning tools

Different types of tool, based on data from the transboundary information system (cf. chapter on monitoring optimization) can be useful in the planning process. These strategic planning tools (which cannot replace an appraisal made by basin managers) include decision-making tools based on modelling, economic tools, environmental tools and geographic information systems.

Decision-making tools employ models to simulate hydrological and hydraulic operations and water resource allocation based on usage and geographic zones. The latter application is particularly useful to illustrate the division between countries in the basin. Some tools can also model aspects linked to water quality, and even transport of solids.

Quantitative models can be used to simulate different scenarios according to:

- Hydrometeorological data (dry or wet years, rainfall and flow records);
- Different construction options, in particular new large structural facilities on a transboundary scale and their combinations within the basin;
- The potential consequences of climate change on usages and environment.

4.1.2 *Master plan and implementation*

Transboundary master plan

Following the diagnosis, the next step is to define the actions to be implemented. These can be of different types and transboundary in various degrees . As well as institutional or capacity building actions, activities that are most likely to benefit from integration between countries on the same basin include: hydroelectric production, irrigation, navigation, low-flow support, ecosystem conservation, and measures to combat extreme natural phenomena (flooding, drought) and pollution.

The countries choose a consensual scenario from the different development scenarios studied, and break it down into actions. Benefits and costs linked to the activities are shared out in a consensual manner between the different countries in the basin, based on the results of different economic simulations and following a process of participation and negotiation.

Programming and implementation

Since strategic planning is anticipated over the long term, the priority actions are itemized in a short-term programme (i.e. a few years). The budget takes the form of a programme of investment and activities (training courses, studies, creation of an information system), to be shared out fairly between basin countries as far as possible.

The implementation process is iterative, and the plan must be reviewed after several years in order to implement the next programme, integrating new data and taking into account the outcome of past action, new results and future developments.

The basin organization devises the strategy and funding arrangements, which can be very different depending on the type of action. Costs are shared between countries in line with the sharing of benefits resulting from the actions.

A distinction shall be made between structuring actions (new constructions, works, rehabilitation, maintenance), technical actions (studies, monitoring, capacity building) and institutional actions (procedures, regulations, governance).

4.2 Planning practices

4.2.1 *Niger Basin Authority*

Shared Vision process

On the Niger basin, drawing up a Sustainable Development Action Plan (SDAP) for 2025 and formulate an associated Investment Programme constituted a crucial step in NBA's Shared Vision process. The process ran from 2003 to 2008, in the following order:

- Multisectoral national studies and regional overview (2004-2005);
- Decision-making tools (2006-2007) – hydrological management model with a module on the economic analysis of water usage used for drawing up the SDAP;
- Formulation and adoption of the SDAP (July 2007);
- Drawing up of the Investment Programme 2008-2027 (December 2007);
- Summit of Heads of State and validation (April 2008);
- Funding parties' roundtable (June 2008).

Due to political deadlines, the planning documents were drawn up fairly quickly, for example the Investment Programme was produced in a few months.

The total cost of NBA's different planning stages came to € 4,325,000, broken down as shown below.

Stage	Cost
Tools	€ 1,950,000
Workshops and validation	€ 380,000
User participation	€ 440,000
Communication	€ 150,000
APSD	€ 760,000
Investment Programme and round table	€ 645,000
Total	€ 4,325,000

Support throughout the various stages of the process was provided by partners (France, Canada, Europe, World Bank, ADB), coordinated by NBA.

An evaluation of the first five-year plan's implementation (2008-2012) was carried out in 2012[5]. The plan's success can mainly be put down to the political commitment constituted by the Shared Vision, the existence of the SDAP, the IP and the Water Charter, regular technical and financial support from partners, and respect of the clauses of the partners' cooperation framework, signed in Paris in April 2004.

Decision-making tools

A water resource allocation model on the scale of the Niger basin (cf. bibliographic reference PN1) was of great use in drawing up the APSD. Thanks to the model, the NBA now possesses a simulation and decision-making tool relating to water requirements, development and resource management in the Niger basin. The model is particularly useful for analyzing the compatibility and interdependence of structuring hydraulic facilities.

[5] Unavailable results.

In 2007, by simulating several scenarios, the model provided the hydraulic elements required to produce the Niger basin's Action Plan for Sustainable Development and Investment Programme. An economic module added to the hydraulic model was used to measure the differences between the scenarios.

The tool was devised by consultants on NBA premises with input from permanent experts of the NBA's Executive Secretariat, in order to guarantee its long-term acceptance and usage. The sampling database created in 2007 was updated in 2012. The tool is regularly used to test specific scenarios (e.g. facilities at Kandadji and Markala).

Two other decision-making tools are being built:
- a technical tool to examine anticipated measures;
- a computerized tool for the coordinated management of dams. This tool defines the rules and guidelines for coordinated management of structuring dams in the Niger basin along the main lines of the IWRM as defined in the SDAP. At basin scale, it aims to anticipate and resolve potential conflicts between the different usage sectors (socio-economic activities and environmental resources).

Sustainable Development Action Plan

The Sustainable Development Action Plan (SDAP) is the Niger Basin Authority's strategic key document (reference PN3) for 2027. It was produced in two phases:

- Overview – diagnosis presenting the status report , trends observed, constraints , development opportunities, and other international, regional or sub-regional initiatives and programmes;
- Master plan for the basin's water development and management - it includes covering guidelines and principles for sustainable development, justification and priorities for basin-scale development, analysis and ranking of priorities, and institutional aspects of implementation.

Actions are split into the following three main priority domains determined by the countries:
1. Development of socio-economic infrastructures,
2. Conservation of the basin's ecosystems,
3. Strengthening of capacities and stakeholder participation.

Sharing benefits between the nine countries involves, among other things, ensuring that direct benefits generated by developments are apportioned , in order to balance the share of benefits received and the share of investments made by each State.

The APSD was updated to integrate data from the Strategic Action Plan drawn up within the project funded by GEF.

Investment Programme

NBA's Investment Programme (reference PN3) is the budget equivalent of the APSD. It is divided into five-year periods, the first of which is marked as a priority. The total budget for the four five-year plans is estimated at 5.6 billion euro for 639 activities or projects.

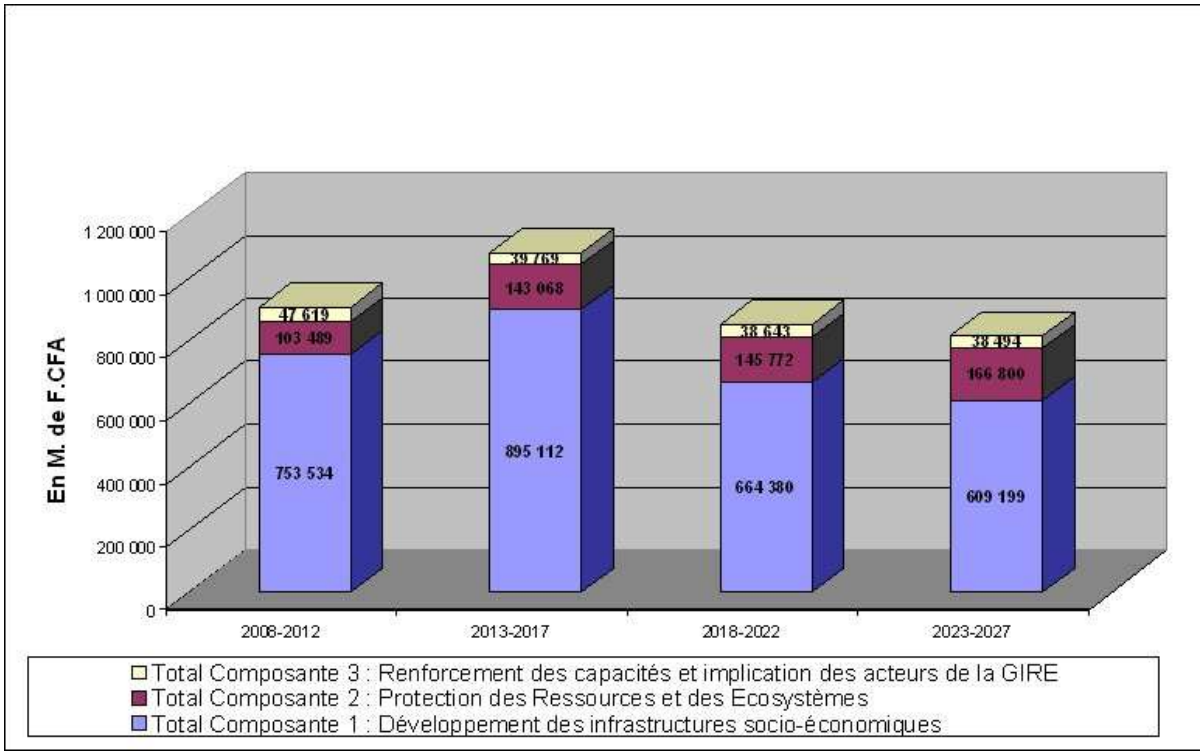


Figure: breakdown of investment by component of NBA's APSD

As it can be expected, the above graph shows that infrastructures absorb a significant share of investments: the cost of constructing three new large dams in Fomi, Taoussa and Kandadji (the latter is under construction) and the associated measures represent around half of the total amount of the priority five-year plan.

The Investment Programme was revised in 2012 to integrate actions scheduled in the Strategic Action Plan of the GEF project "Reversing Land and Water Degradation Trends in the Niger River Basin". It now includes 729 activities or projects, amounting to an estimated 6.3 billion euro, or 9.34 billion US dollars.

The targets of the Investment Programme's first five-year period (2008-2012), despite many announcements, have ultimately been accomplished by around only 20%.

Stakeholder participation

Civil society has progressively been involved in the Shared Vision process during the following stages:

- Regional coordination of users set up in 2005;
- Niger basin water users identified and characterized;
- First regional form of water basin resource users held in February 2006 in Fada-Ngourma;
- National coordination units set up and regional coordination made autonomous;
- Regional user representative participation in NBA decision-making bodies.

Contracting of activities

A study carried out in 2009 on the contracting of projects and programmes (reference PN4) made several recommendations including:

- NBA is the pertinent contracting level for all activities linked to the project cycle of shared or "common interest" structures (cf. definition below) - studies, mobilization

of funding, construction and operation, compensatory and associated measures, sharing of costs and benefits, regulation and coordinated management;

- Different new bodies should be created within NBA (single point of contact at the Executive Secretariat, Heritage Management Agency, Dam Agencies) to implement activities successfully;
- Different Public-Private Partnership options are available depending on financial engineering and the status of constructions;
- NBA is not the pertinent contracting level for action relating to some other domains (drinking water and sanitation, health, livestock, tourism).

The Niger basin Water Charter (cf. chapter on governance) distinguishes two types of major construction, notwithstanding those of a purely national character:

- "Shared constructions" – constructions that NBA member states have decided by legal act to make their shared and indivisible property (to date, no constructions come into this category, but the Fomi dam could be a pilot case);
- "Constructions of common interest" – constructions of interest to two or more NBA member states for which they jointly agree to coordinated management (e.g. Kandadji and Taoussa dams).

Other

The Strategic Action Plan for the Niger River basin (reference PN5) was produced as part of the project, "Reversing Land and Water Degradation Trends in the Niger River Basin", funded by GEF. This programme, which results from the transboundary diagnosis analysis initiated in 2005, was added to the APSD in October 2010.

4.2.2 *Volta Basin Authority*

A status report on the socio-economic and environmental situation in the Volta basin and an analysis of problems and issues in sustainable water resources management were produced in 2011 (reference PV4). A "material balance" was also carried out, providing orders of magnitude on the proportion of flows and evaporation in relation to rain, and the proportion of water available for different uses. The status report concluded that, "The three most closely connected problems concern the variability of flows, the degradation of aquatic systems, and pollution".

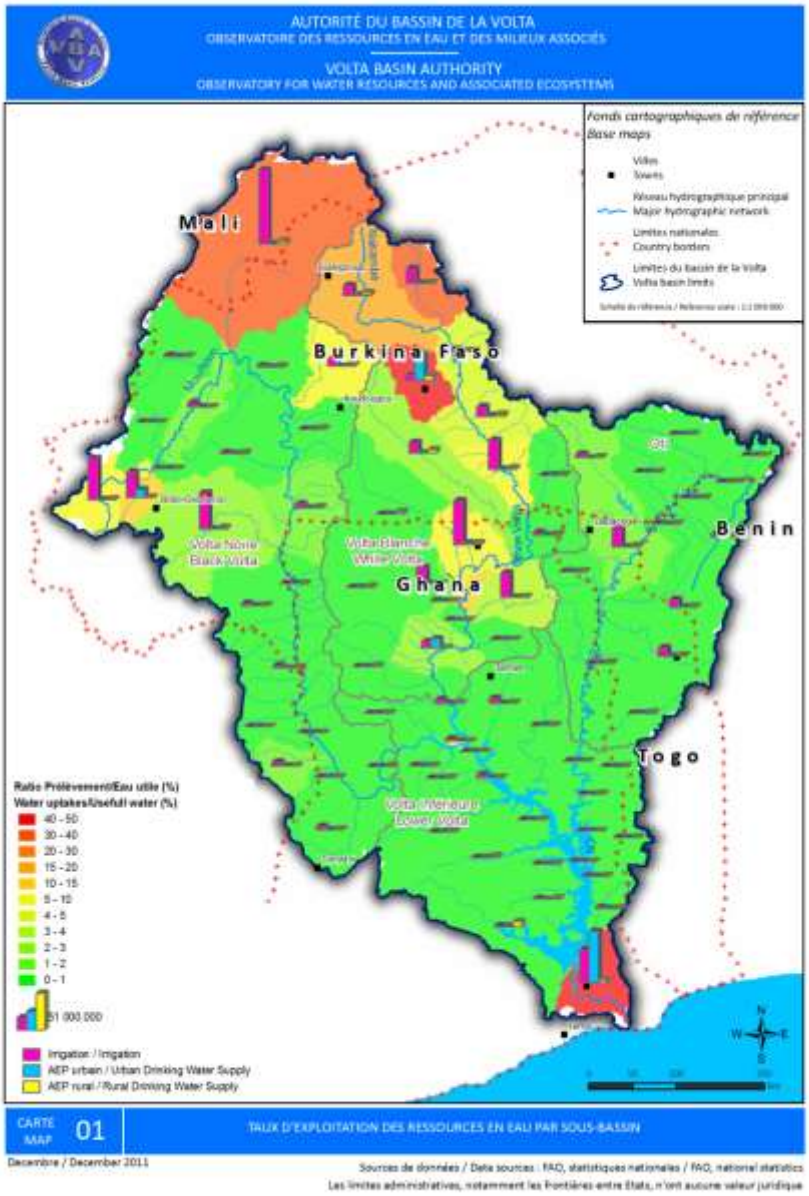


Figure: VBA status report – Exploitation rate of water resources by sub-basin

Based on the report, the production of a master plan for the Volta basin has been a priority activity for VBA's executive management over the last few years. The main terms of reference for the master plan were written at VBA's expert committee meeting in May 2012, but funding remains to be found for producing the plan. The corresponding

study includes in particular an examination of development scenarios using a hydrological simulation and allocation model.

The Project for Improving Water Governance in the Volta River Basin (PAGEV) produced an "audit" of the basin in 2007 (revised in 2010) (reference PV1), which studied the availability of water in the two main countries (Burkina Faso, Ghana) and involved a succinct modelling (needs-resources comparison) using the WEAP tool. PV1 makes the following recommendations:

- Databases and methods used in the two countries should be harmonized;
- Model should be refined with a breakdown of requirements for irrigation and livestock.
- Information on water quality is insufficient;
- The project evaluating groundwater in Ghana provides data, and a similar evaluation should be carried out for Burkina Faso;
- Data on the characteristics of reservoirs should be used.

A transboundary diagnosis analysis of the Volta River basin has been made in the six countries on the basin (reference PV2), funded by GEF. A strategic action plan should be drawn up on this basis, but connections with the VBA master plan remain to be established.

The CGIAR Challenge Programme on Water and Food (reference PV3) has undertaken several projects, many of which could contribute to the VBA master plan.

4.2.3 *Water Resources Coordination Centre*

Several documents can be used for planning in transboundary basins in West Africa:

PO1 IWRM action plan for West Africa (ECOWAS, 2003);
PO2 Regional integration for growth and poverty reduction in West Africa: strategies and action plan (ECOWAS-UEMOA, 2006);
PO3 West African water resources policy (ECOWAS, 2007);
PO4 Summary of forecasting studies on water and uses in West Africa (WRCC, 2008);
PO5 Cooperation on major infrastructure projects in the water sector in the ECOWAS area.

The dialogue on major dams initiated by WRCC (PO5) produced several results in 2011, including the panel of expert's Recommendations (good practices for developing sustainable hydraulic infrastructures in West Africa) and an Evaluation of priority construction projects. It is worth noting that the hydroelectric master plan established by WAPP is not totally coherent with the priorities put forward by WRCC, although it is in line with those of PIDA (UA, BAD, NEPAD).

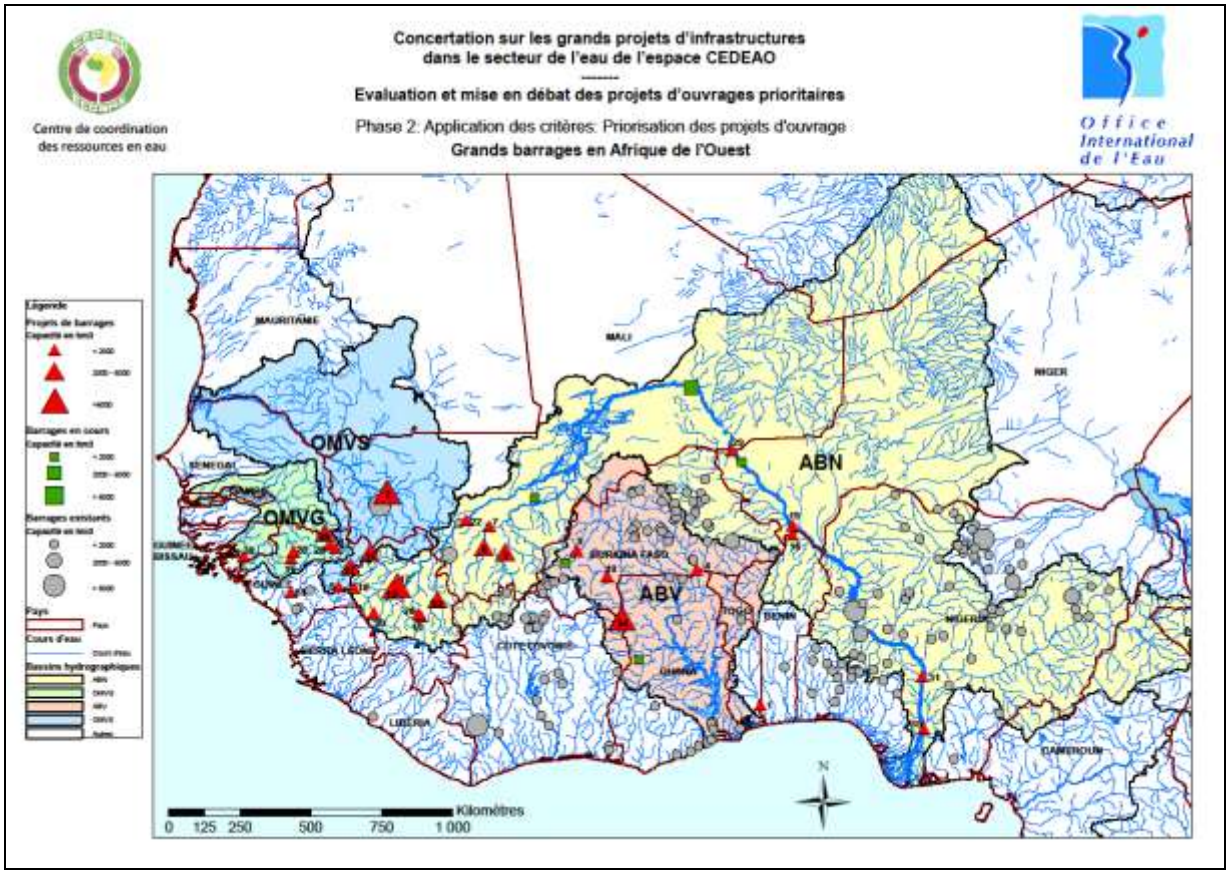


Figure: map of major hydraulic infrastructures in West Africa

4.2.4 *International Commission of the Congo-Oubangui-Sangha River Basin*

CICOS produced a Strategic Action Plan for integrated water resource management of the Congo River basin in 2010 (reference PC1), covering twenty years. Starting with a basic document evaluating the basin's situation, the plan was drawn up thanks to a dozen sectoral development projects. It makes a distinction between projects to be contracted by CICOS and other projects.

CICOS's Strategic Action Plan was produced with a support from the African Water Facility amounting to € 2,000,000.

The document constitutes a reference framework for the basin's development, but requires clarification and additions, peculiarly in terms of major hydroelectric infrastructures, which concern most of the investment. A decision-makingtool was not used for these constructions. As a result, the list of projects put forward didn't include justifications about choices or alternatives.

Participative workshops were organized during the plan's development, but only a handful of civil society representatives took part in the activities. There was no systematic approach to include non-organized users.

	Projets 'A Maîtrise d'Ouvrage CICOS'		Projets 'Autre Maîtrise d'Ouvrage'		Ensemble Projets du PAS	
	Nombre	Montant	Nombre	Montant	Nombre	Montant
1. Renforcement des capacités	42	38,4 MEur	-	-	42	38,4 MEur
2. Systèmes d'Information	18	34,7 MEur	-	-	18	34,7 MEur
3. Communic. Educ. Sensibilisation	6	45,2 MEur	-	-	6	45,2 MEur
4. Etudes	24	77,7 MEur	6	21,8 MEur	30	99,5 MEur
5. Recherche&Développement	8	5,65 MEur	-	-	8	5,65 MEur
6. Investissements	24	2.467,8 MEur	13	11.515,1 MEur	37	13.982,9 MEur
TOTAL	122	2.670,0 MEur	19	11.536,9 MEur	141	14.206,9 MEur

Table: CICOS Strategic Action Plan projects by contracting party

The Strategic Action Plan was presented to CICOS partners at a round table in June 2011. A Priority Investment Programme 2011-2015 (reference PC2) was then drawn up based on the Strategic Action Plan. 94 priority projects were chosen from the plan's 141 projects for the first five years. However, the allocation of only a small portion of funding was announced.

In conformity with CICOS's mandate, a Master Plan for Water Development and Management (SDAGE) for the Congo River should be produced within the next few years. This master plan will supplement and clarify the Strategic Action Plan. A tool for modelling and allocating water resources in the Congo River is being developed with funding from FFEM to help produce the master plan, notably in terms of major hydroelectric infrastructures.

4.2.5 *Organization for the Development of the Senegal River*

The Master Plan for Water Development and Management (SDAGE) for the Senegal River (reference PS1) was produced in 2010 using a participative process. Following a status report validated in 2009, seven sectoral plans were drawn up. A resource management model was used to compare different scenarios in order to put forward a programme of action for 2025 in line with the chosen scenario.

Most investment is taken up by infrastructures for transport, energy and drinking water supply. These correspond to second and third generation structures, which complete the Manantali and Diama dams.

Apart from these new constructions, which have been separated from the other actions, the proposed measures are gathered into six basic targets:

- Conserving resources and adapting to climate change;
- Supporting development;
- Building knowledge;
- Improving behaviour;
- Developing solidarity in the basin;
- Reducing risks.

In order to make it easier for civil society to participate, "picture boxes" (reference PS2) were used during the different phrases of the SDAGE.

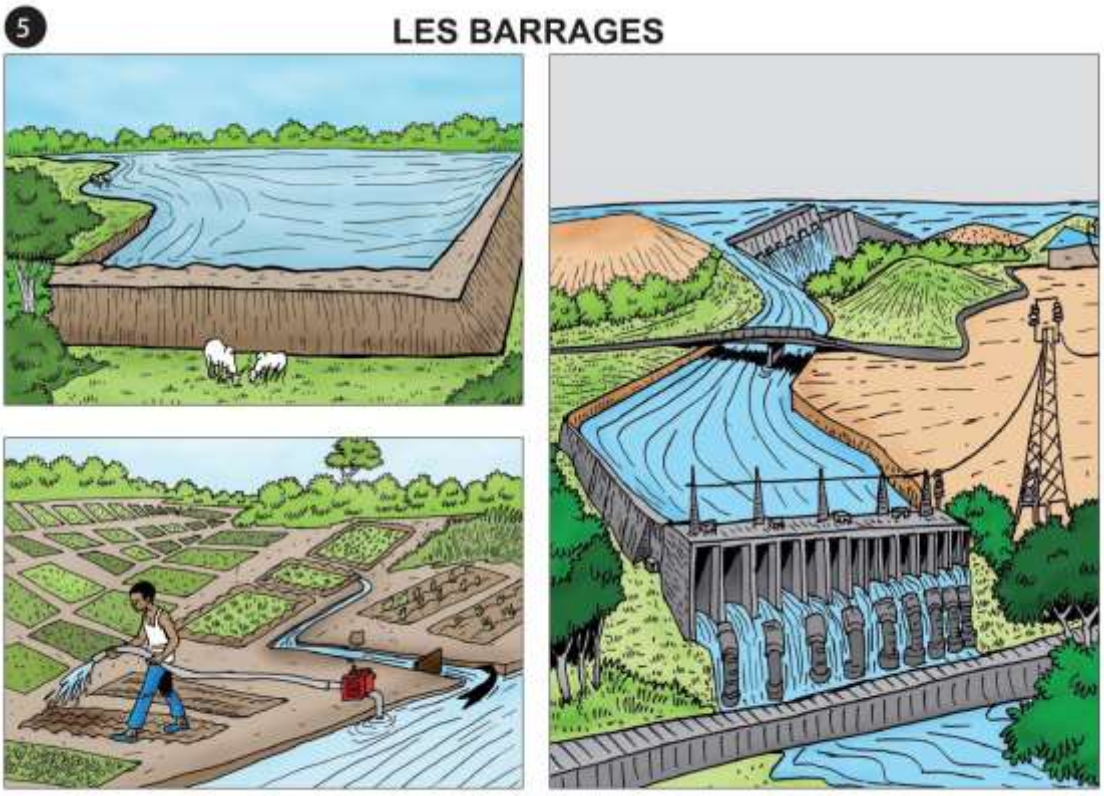


Figure: example of a picture used to encourage participation in the OMVS

A Transboundary Diagnosis Analysis and a Strategic Action Plan on the Senegal River basin (drawn up with a GEF funding) were integrated into the SDAGE.

The OMVS SDAGE is an iterative tool designed for periodical revisions. A specific website http://sdage-fleuvesenegal.org and a brochure PS3 have been produced.

A transport and energy master plan is currently being put in place, since the Félou Dam has started production. An action plan produced in 2005 on improving crop irrigation has been updated with Guinea. In addition, three pilot zones have been validated for local "SAGE"-type plans on specific themes such as pollution and deterioration.

4.3 Overview and recommendations regarding planning

Summary table of planning practices

Institution	+++ completed ++ advanced + started - not started			
	Status report	Tools	Plan	Implementation
NBA	+++	+++	+++	+
VBA	++	-	-	-
WRCC				
CICOS	++	+	++	+
OMVS	+++	+++	+++	++

4.3.1 *Diagnosis*

- Monitoring (cf. relevant chapter) and data from the basin organization's **information system** provide the basis of the transboundary diagnosis. A significant amount of information is often available from different projects carried out at catchment basin scale or country scale; it may nevertheless be necessary to build up knowledge on several specific subjects for which data are generally less available (e.g. aquifers);
- Making a solid diagnosis doesn't mean skimming over subjects, but rather answering genuine questions after identifying the **major challenges**

4.3.2 *Planning tools*

- Making decisions on developments, in particular major hydraulic infrastructures, requires using a hydrological **simulation model** that allocates water resources. This allows the comparison of different development scenarios and provides technical data to reach a consensual choice between basin states;
- This kind of tool can also integrate the impacts of **climate change** by forcing input data records (rain, temperature). Here in particular, the inherent uncertainties of these tools need mastering;
- An **economic tool**, used to optimize the programme, can be combined with the hydrological tool;
- Taking on these tools requires specific **training** for basin organization staff. National experts will usually be trained on the general concepts, so as to be able to evaluate the results produced by the models.

4.3.3 *Plans and programmes*

- The action plan should above all be **realistic**, and respond to the various challenges without being over ambitious;
- Some projects set up at basin level lead to **sectoral plans** (e.g. environment). Integrating these into the overall programme sometimes comes up against constraints.
- Action should correspond to the basin organization's "profession" (i.e. water management), and try to avoid overlapping into unrelated activities (e.g. roads, drinking water supply, etc.). The action plan should promote projects of a **transboundary character** rather than purely national actions, when they do not impact on other countries or involve the basin organization;
- The investment programme and its **budget schedule** must be credible for funders, by identifying potential contributors as early as possible (starting with self-funding);
- **Major constructions** represent a significant share of investments (50% to 90% of the programme's costs). Their influence often extends over a much larger territory than the basin, particularly in terms of agriculture, energy production and the environment. This requires examining regional projects (prioritization of constructions), and carrying out hydrological and allocation modelling at basin level;
- Once again regarding major constructions, complementary investigations are often neglected, despite ensuring a "comprehensive evaluation of options" (cf. reference PA1), including optimizing the management of existing facilities, rehabilitating them if necessary, and using groundwater. **Evaluations of available options** are often restricted in scope and remain confined to technical parameters and the application of cost-benefit analyses. Alternatives could in particular focus on agricultural aspects (more efficient irrigation, development of rain-fed agriculture and low-lying land irrigation);
- When available, action plans make it easier to **mobilize funding**, e.g. through roundtables, which should be judiciously prepared.

4.3.4 *Institutional aspects*

- Projects **contracted** by the basin organization differ from those developed by national institutions;
- The participation of **civil society** is necessary throughout the planning process, requiring support and popularization tools. Considering the number of people concerned (i.e. water users, often not organized), information from the field should initially be disseminated at national level (via local communities and interest groups with effective national representation) and then consolidated at a transboundary level;
- Programming is cyclical (e.g. 5 years) and fits in with an overall strategy that is necessarily longer term (e.g. 20 years), with regular **updating** of the programme to reflect developments and changes on a regional and global scale (climate, urbanization, etc.);
- The existence of a **legal** document (e.g. Water Charter) makes the consensual implementation of the plan easier, in terms of both development and management actions.

4.3.5 *Implementation*

- Throughout the production process, the basin organization must be totally **familiarized** with planning documents produced by external consultants. Sufficient human resources should be mobilized, including for the implementation phase;

- The passage from the planning phase to the implementation phase is a fundamental stage for the basin organization and may require **reorganization** (or even a change of statutes) with the creation of new bodies and mechanisms, in particular to facilitate operational connections with States.
  From this point of view, the Niger Basin Authority's institutional and organizational audit (cf. chapter on governance, reference GN1) suggests "a circular methodology, the Deming cycle, named after its inventor, which aligns future ambitions to match past ambitions that have not been fulfilled yet":

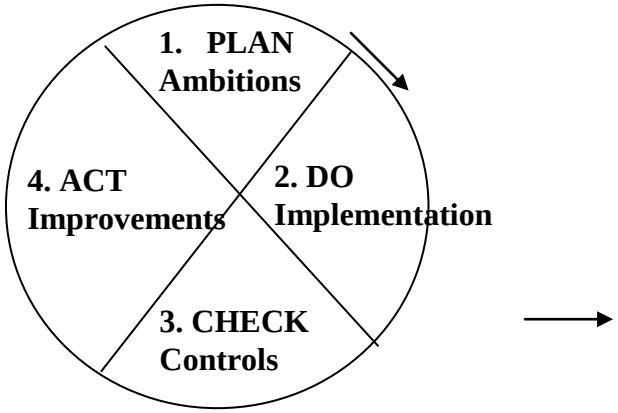


Figure: Deming's cycle

  A strong **pace** should also be maintained when implementing an action plan at the risk of losing partners' interest;
- A strategy should be put together for implementing the programme of measures. A balance needs to be struck between the **financial resources** that can be mobilized to implement the programme, which may need to be scaled down. Benefit sharing between countries should be judiciously studied;
- Implementing an action plan goes hand in hand with a move from an approach that involves undertaking distinct projects in parallel, to an approach in which the basin organization controls a **global programme** into which new projects are incorporated.

NBA

VBA

WRCC

CICOS

OMVS

FUNDING

Good practices and recommendations

ANBO

5. Funding

This chapter mainly focuses on the financing of basin organizations' operations. It also looks at funding for certain activities, in particular those relating to developments and infrastructure.

In December 2008, the United Nations Economic Commission for Africa published a document[6] on the options for setting up autonomous funding mechanisms for institutions of regional integration in West Africa. This document mentions in particular:

"Like everywhere in Africa, funding has long been viewed as one of the biggest obstacles to achieving the objectives that West African states have set their regional integration and cooperation institutions…

Traditionally financed by state contributions and aid from external donors, funding for integration has been sorely tested since the mid-eighties in the West African sub-region. Indeed, countries have been obliged to carry out budgetary reforms in order to straighten out their own public finances as part of structural adjustment programmes, which has jeopardized their financial contributions in regional integration and cooperation institutions. The regular system of state contributions to the budgets and funds of these IGOs has thus become unreliable.

This slowing down of traditional methods to mobilize resources for regional cooperation has led stakeholders and organizers of the integration process in Africa to direct their efforts towards seeking and setting up alternative funding mechanisms for IGOs that are ***more autonomous*** *(both in terms of national funds and international aid) and* ***more sustainable****, capable of sustainably tackling obstacles. Progressively, the concept of autonomous funding has been integrated into the substantive law of most 2nd and 3rd generation African institutions (ECOWAS, WAEMU, UDEAC/CEMAC, ECCAS, COMESA), and into the Abuja Treaty that institutes the African Economic Community (article 82)."*

Basin organizations today provide a number of services, mostly "unpaid", on:

- Integrated water resource management, with the appropriate legal and institutional organization (cf. chapter on governance);
- Knowledge of basins, especially via the Basin Observatories (cf. chapter on monitoring);
- Simulations or hydrological forecasting;
- Setting up and running regional-scale projects Some of these projects do not have their own accountancy or finance facilities and consequently rely on the services of basin organizations, which ensure the role of ordering party, sometimes executing agency and often financial controller;
- Drawing up transboundary planning documents (cf. chapter on planning);
- Implementing investment programmes;
- Coordinated management of major hydraulic facilities, for some of these organizations.

[6] United Nations, Economic Commission for Africa, Sub-regional Bureau for West Africa, 6 December 2008. Higher-level Meeting on autonomous funding mechanisms for Regional Integration Institutions in West Africa. Options for instituting autonomous funding mechanisms for regional integration institutions in West Africa.

To ensure that transboundary basin organizations are capable of efficiently carrying out these functions, they must possess sustainable, appropriate funding systems, which must be constituted in order to respond to:

- The basin organization's different missions/functions, which must themselves result from a clear mandate;
- Funding requirements in the basin, established in line with priorities and choices;
- The chosen deadlines (need for short-, mid- or long-term funding).

5.1 Funding practices in basin organizations

5.1.1 *Payment of contributions by member states*

The funding for operating basin organizations[7] comes mainly from an annual contribution made by each member state. This system allows member states to illustrate their confidence in the organization and in the solidarity process. In order to ensure mid-term financial visibility, this state contribution system is organized within a regulatory or contractual framework between states and the basin organization, which also determines the allocation criteria for national contributions.

This sensitive subject often leads member states to conclude an agreement on allocation criteria, integrating political elements and states' potential contributions and interests. Nevertheless, this type of agreement also considers other objective and measurable criteria, such as the proportion of the water course, withdrawals, population, basin area, economic activity of each country in the basin, and the level of involvement in managing the basin's water courses.

Thus, in the case of NBA, for which most of the resources of the Executive Secretariat (ES-NBA) come from member state contributions, the allocation criteria have evolved as follows:

[7] The practices described here after do not concern the WRCC, which is directly funded by ECOWAS.

Figure. Evolution of allocation of contributions to NBA's operating costs

Country	1980	1987	Since 2000
Benin	11.11%	10.89%	5.00%
Burkina Faso	11.11%	9.30%	4.00%
Cameroun	11.11%	10.27%	7.00%
Côte d'Ivoire	11.11%	9.92%	5.00%
Guinea	11.11%	11.33%	10.00%
Mali	11.11%	12.91%	20.00%
Niger	11.11%	12.65%	18.00%
Nigeria	11.11%	13.78%	30.00%
Chad	11.11%	8.95%	1.00%
Total	100.00%	100.00%	100.00%

In 2005, member state contributions rose from FCFA 400 million to FCFA 500 million, and from the 2009 financial year, it increased by 50% to FCFA 750 million (€ 1,15M). The Executive Secretariat's 2011 budget (including projects and programmes) was adopted by the 29th Ordinary Session of the Council of Ministers on income and expenditure for FCFA 37,664,174,434 of which FCFA 945,500,000 was for running the Executive Secretariat. The total reviewed budget comes to FCFA 29,123,560,008.

VBA's allocation scale follows the same criteria, considered as, "objective, measurable, and with clear signification". They are set out as follows:

- The area of the basin in the country, representing the potential added value that the country could gain from developing the basin's resources;
- The number of residents in the national portion of the basin, representing the use of the primary state of the basin's natural resources, and the level of their current deterioration;
- The annual income per inhabitant, which reflects the country's economic capacity;
- Solidarity between Party States translated by an equal share of 30% of VBA's operating costs.

The combination of these four criteria gives the allocation scale shown in the following table.

Figure. Allocation of contributions between VBA party states

Party state	Benin	Burkina Faso	Côte d'Ivoire	Ghana	Mali	Togo
Contribution (%)	10%	29%	09%	29%	09%	14%

Figure. VBA's revised 2010 budget, of which 313 MFCFA from member states

Function	Amount (CFA)
Operations	274,864,809
Investments	51,000,000
Activities	1,125,000,000
Unforseen	14,700,000
Total	1,465,546,809

5.1.2 *Contribution arrears*

Within basin organizations, resources from member states, although theoretically stable, vary significantly from one year to the next. These instable resources make it difficult to manage cash funds. As an example, for NBA, on 30 June 2011, contribution arrears came to FCFA 892,649,416.

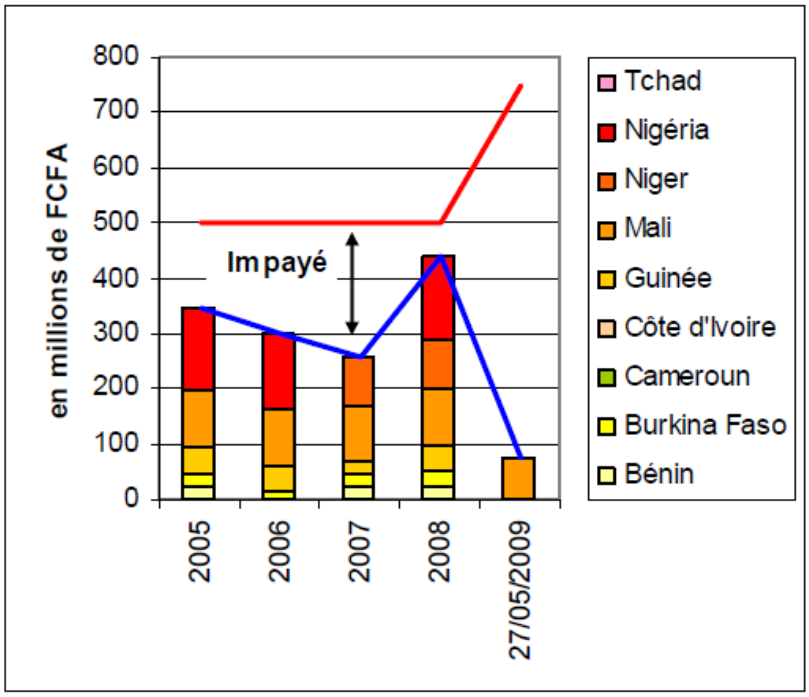


Figure. Payment of annual contributions of NBA member states

Despite the volatile revenues from member state contributions, the Executive Secretariat's expenditure remained relatively stable from 2004 to 2006. Low revenues in 2006 thus caused a **budget deficit of 119 million FCFA**. The coverage rate of expenditure by revenue, which was above 100% in 2004 and 2005, was less than 80% in 2006.

The VBA has also incurred significant arrears in contributions paid by member states

Figure. Payment of financial contributions by VBA member states

Source	Budget allocated			Payments		Annual arrears
	2009	2010	Total	2009	2010	
Benin	20,046,775	31,367,479	59,414,254	0	0	59,414,254
Burkina Faso	81,335,600	90,965,690	172,302,290	81,335,600	50,000,000	40,965,690
Côte d'Ivoire	25,242,100	28,230,731	53,472,831	0	0	53,472,831
Ghana	81,335,600	90,965,690	172,301,340	0	0	172,301,340
Mali	25,242,100	28,230,731	53,472,831	50,484,200	2,988,631	0
Togo	39,265,490	43,914,471	83,179,961	0	43,914,471	39,265,490
Total	**280,467,715**	**313,674,792**	**594,142,507**	**131,019,800**	**96,903,102**	**365,419,605**

5.1.3 *Community Integration Tax*

The heads of state and government of the Economic and Monetary Community of Central Africa (CEMAC) increased its budget during a session on 14 December 2000, by Additional Act No. 03/00-CEMAC-046-CM-05, which came into force on 1 January 2002. This Act provides for setting up a Community Integration Tax (TCI). The TCI represents 1% of the customs value of goods imported from outside CEMAC destined for consumption in all countries in the community. National customs agencies place TCI payment orders daily into accounts opened in the name of CEMAC in national BCAS' branches.

CICOS, as a CEMAC institution, is funded by the general Community budget, as are the higher bodies (Conference of Heads of State, Council of Ministers), the Executive Secretariat, the CEMAC Court of Justice, etc.

CEMAC's TCI currently contributes to CICOS funding. This raises several representativeness issues, because:

- CICOS has three members that are part of CEMAC (Cameroon, CAR and Congo) and one from outside CEMAC (DRC);
- CEMAC has three members that are from outside the CICOS basin (Gabon, Equatorial Guinea and Chad).

In reality, Cameroon, Central African Republic and Congo, which are members of CEMAC, therefore contribute to the CICOS budget via the TCI. This form of funding represented 70% of the overall budget of € 1.37 M in 2010.

As for NBA and VBA, each member state's contribution to the CICOS budget is determined according to a jointly defined scale: 10% for the Republic of Cameroon, 30% for the Central African Republic, 30% for the Republic of the Congo, and 30% for the Democratic Republic of the Congo.

The TCI mechanism means that payment does not have to be initiated by each country's Minister of Finance: contributions come to CICOS directly from CEMAC. The Democratic Republic of the Congo, which is not a member of CEMAC, pays directly into the CICOS budget. It is worth noting that DRC's contribution arrears totalled almost 2 million euro up to 2011, but the situation was put in order in 2012 and 2013.

5.1.4 *Specific OMVS experience*

The situation for OMVS is unusual as the "OMVS System" comprises the High Commission, decision-making bodies (Summit of Heads of State, Council of Ministers, Permanent Water Commission, Basin Committee, National Focal Points, etc.), operating companies (SOGEM for Manantali, SOGED for Diama) and navigation companies.

Following Resolution No. 188/CM/MN/N of 16 October 1985 of the Council of Ministers, which modified the division between member states of the Manantali Power plant's energy yield, a new attribution scale was adopted by Resolution No. 197/CM/SN/D of 18 December 1986. This scale, which is currently in force, was devised to reflect each country's interest and advantages for every main sector of economic activity, as shown below:

COUNTRY	**IRRIGATION**	**ENERGY**	**NAVIGATION**	**ALLOCATION**
	Diama + Manantali **%**	Manantali %	Manantali %	**Diama + Manantali** **%**
MALI	11	52	81.00	35.3
MAURITANIA	31	15	11.68	22.6
SENEGAL	58	33	6.59	42.1

Collection by SOGEM of amounts linked to electricity has significantly declined in recent years, leading to a high level of arrears and a weaker OMVS system. Significant efforts have been undertaken to streamline the process, control costs and improve collection.

In terms of ports and navigation on the Senegal River, beyond the institutional model planned by OMVS (cf. chapter on governance), usage fees are governed by regulatory texts, i.e. Rules of Application for the International Code of Navigation and Transport on the Senegal River adopted in 2011.

The Rules of Application for the International Code of Navigation and Transport on the Senegal River were adopted in 2011 in its regulation on river ports, river sea ports and river stops. They involve:
- Usage fees in ports and river stops;
- Usage fees on goods, weight or units depending on the nature of goods.

These usage fees will be applied in the very near future on navigation and transport activities on the Senegal River. In addition, a study of pricing for SOGENAV services will be produced in 2014.

5.1.5 *Conclusion on funding practices*

Most of NBA and VBA's operating budgets are linked to state contributions. Both of these basin organizations, and also the CICOS for non-TCI funding, have experienced difficulties with payments and contribution arrears. They are therefore faced with a problem of fluctuating incomes from one year to the next. One of the main consequences is often to record vacant key posts within the institution's executive (although less so for NBA because of the dynamics of the Shared Vision process). Sometimes national political situations are the cause of transient difficulties, although this is in general not the case.

Repeated arrears sometimes let arouse relative disappointment in the results of the basin organization. If organizations' work is inefficient or dissatisfactory, the allocation of member contributions constitutes a problem, because the cost seems high for an ineffective entity. In addition, members may mistakenly perceive the basin organization's action to be of little benefit or interest, which points to the importance of displaying "good" performance indicators.

To reduce the risk of non-payment of annual contributions and avoid payment arrears, the agreement on allocation criteria sometimes stipulates sanctions for states that do not pay their share (e.g. loss of right to vote). This measure is not currently applied in the basin organizations studied. More significant investment by TBOs, or even lobbying, could perhaps help ensure that payments are collected.

Sometimes, parties are insufficiently aware of the likely benefits from a correctly operating basin organization: the cost of its operations, (i.e. the payment if salaries and overheads) is only a small part of the total financial outgoings generated by the institution's activities. Countries' direct contributions are fairly insignificant in relation to the development challenges of a transboundary basin, in particular in terms of infrastructure. The allocation issue is thus only relatively important.

5.2 New funding schemes

In general, four types of funding needs exist:

1. To cover the basin organization's operating costs (i.e. pay staff salaries, premises, travel expenses and supplies) and finance statutory action carried out by the organization (studies, workshops, training, travel, promotion of the institute, communication, etc.);

2. Funding the organization's current missions, such as monitoring, database management, planning, etc.;

3. Financing of different scheduled activities than those related to hydraulic infrastructures and under the competence of the basin organization;

4. Financing of hydraulic infrastructures, including studies, construction, maintenance and operation.

It is thus worth trying to achieve financial autonomy in the organization's everyday running costs, to give it a degree of independence from member states and long-term visibility on

reliable financial resources. A funding system's sustainability will be established once a significant share of the operating budget is covered by guaranteed, regular resources coming from the basin.

This does not mean doing without state contributions, but rather securing additional resources to finance the Permanent Secretariats and "related bodies" in the long term, as well as the basin organization's everyday missions.

5.2.1 *Setting up regional community funding*

The CICOS experience is worth replicating. Some regional integration institutions, or economic communities, such as ECOWAS and WAEMU in West Africa, were set up through ratification of a regional cooperation treaty or convention. These institutions generally involve community levies like WAEMU's community solidarity tax, and ECOWAS's community tax. These levies are usually based on imports of goods, as set out below[8].

(a) The WAEMU experience

Article 58 of the WAEMU Treaty institutes a transitory system to compensate loss of customs revenue endured by some member states following the creation of the Customs Union. In application of the article, a Community Solidarity Tax (PCS) was put in place. From 1 January 2000, the Conference of Heads of State and Government raised the PCS rate from 0.5% to 1%, which represents the only own resources implemented by the Union since July 1996. The current collection scheme consists in a direct circuit of "Customs => Central Bank". In case of non-respect of these measures, the Union is authorized to automatically debit BCEAO accounts.

(b) The ECOWAS experience

ECOWAS's Community Tax (PCC) was set up in 1993 and represents 0.5% of the customs value of consumer goods imported from outside ECOWAS. The PCC is currently around 25 billion FCFA per year.

[8] Source: Strategic study of autonomous and sustainable funding of NBA activities – January 2010

(c) Attractive mechanism with potentially high revenue

As regional integration organizations that play a role in implementing regional integration policies, NBA and VBA could claim a "right of access" to community taxes. It is difficult to imagine each organization working independently and convincing through the "sole" pertinence of its objectives, drive and achievements. It is therefore up to ECOWAS member states to adopt the principle, parameters and modes for implementing an autonomous contribution.

A tax on imports is thus a potential finance mechanism for NBA and VBA. This solution is attractive because it is:

- Easy to collect (direct tax on customs);
- An acceptable tax for those liable (in comparison with income tax or capital tax, or even user fees);
- Possible to set up as a short- or medium-term mechanism.

A tax on imports is a fairly broad tax basis that allows a high level of revenue for a low taxation rate. In the case of NBA, two calculation modes are presented in the "strategic study of autonomous and sustainable funding for NBA activities – January 2010":

- A first calculation based on the value of imports for the 9 member states. The funding mechanism would thus be combined for example with ECOWAS and ECCAS community taxes;
- A second calculation in which funding would be added on to the WAEMU's PCS (inspired by CICOS funding).

(d) But a mechanism with strong political constraints

However, this type of proposition comes up against significant constraints, particularly political ones. Clearly, the **choice of funding base** needs to be defined. Is the solution to link this mechanism to existing community taxes or to determine another funding base that reflects the services provided by these organizations? A link with existing community taxes would allow the States to avoid juxtaposing systems and mechanisms. It is neither conceivable nor desirable to set up an autonomous tax for each existing or future institution.

Adopting this coupling would therefore involve **an upwards adjustment** of the PCS/WAEMU, PCC/ECOWAS, TCI/CEMAC or CCI/ECCAS in the countries concerned (member states, possibly other West African and Central African states). It would also mean guarding against **economic risks**. In case of economic crisis or recession, the revenue generated by this tax would be affected. In addition, the experiences of ECOWAS, WAEMU and CEMAC show that payment arrears (or even exoneration) are relatively common.

However, the complexity is above all of a **political nature**. The respective NBA and VBA member states, in cooperation with regional integration organizations and all of their member states, need to agree. One of the arguments put forward is a fear of opening the door to appeals from numerous other domains and institutions.

Another politically complex aspect is that some basin organization member states may not belong to the regional institution or, on the contrary, a member state of the regional economic community may not belong to the basin organization. For instance, NBA member states are not all part of the same economic integration area (Central Africa for Chad and Cameroon; West Africa for the other seven).

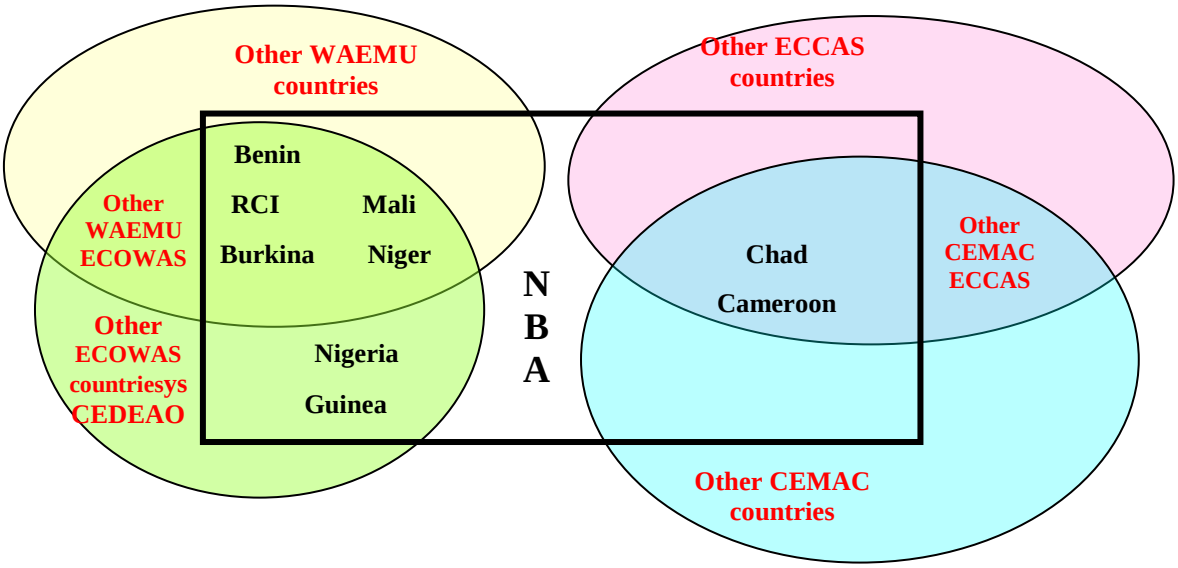


Figure. Non-synchronization of regional bodies and countries on the Niger basin

Lastly, it could be argued that a tax on imports is a tax on a share of national expenditure, legally due by importers and ultimately paid by the consumers. The accumulation of these taxes could consequently generate **a burden on consumer prices**, or even foster an inflation spiral.

5.2.2 *Complementary studies are therefore useful on this subject, especially economic ones, to back up the arguments and convince political decision-makers to make progress in this direction.Remuneration linked to a contracting function*

This avenue for funding basin organizations mainly depends on:

- Countries' mutual trust and genuine will to fully assign this function to the organization, beyond founding texts;
- The maturity of the basin organizations concerned, their capacities, technical and economic skills;
- The confidence given by their technical and financial partners.

This will involve identifying actions for which the basin organization can ensure contracting, regional-scale activities naturally being more suitable than local or national ones.

To date, NBA, VBA and CICOS do not have a contracting function[9] for infrastructures, even if it is stipulated in NBA and VBA's mandates.

We can distinguish three types of action and associated contracting:

- Actions that require intervention from national agencies, particularly procurement within states. In addition to payment for agencies, the basin organization may receive a remuneration, based on a percentage of the market price;
- Actions for which the basin organization is responsible for procurement, without the intervention of national institutions;
- Action that concerns significant investments (dams, developing irrigated perimeters, hydroelectric power plants, etc.). This type of action may be accompanied by the creation of managing or operating companies under the responsibility of the basin organization (e.g. SOGEM and SOGED for OMVS).

5.2.3 *Remuneration for contracting assistance on projects and programmes*

The basin organization would be remunerated for its role in accomplishing the actions in the Action Plan / Investment Programme voted by the decision-making bodies of the hydrographic basin organization, during the different phases of the project cycle:

- Preparatory studies,
- General regional coordination (especially for investments with a transboundary impact),
- Mobilization of funding,
- Follow-up/assessment of implementing action and impacts.

This mechanism is based on the actual funding for action and projects by countries and funders. This intrinsically generates a great deal of uncertainty regarding the regularity of payments and cannot therefore be the only solution for funding basin organizations.

[9] NBA did however produce an impact study of Fomi Dam in Guinea. It also "supervised" the rehabilitation of Kainji and Jebba Dams in Nigeria.

5.2.4 *Application of « user pays » and « polluter pay »s principles*

(a) User pays principle

The principle of a **levy** is that water withdrawal (on or off site) and water pollution cause damage to the resource in terms of quantity and quality. A levy can be viewed as a payment to compensate and repair this damage.

Unlike the previous systems, this funding system is closely connected to water and more precisely to one or several services provided to the user. This kind of system can be applied to the main water uses and types of pollution in the basin, but it should necessarily initially focus on those economic activities with the highest added value and profit margin. "Lump-sum" approaches are more operational, in particular when measuring and metering systems are still to develop.

(b) Potential sectors for implementation

For the hydroelectric sector, a levy can be fixed per unit of hydroelectric energy produced. For navigation levies, the rate could be determined according to the number of people or tonnage transported. A tax for maintaining waterways is already in place in CICOS countries. For drinking water supply and the irrigation sector, the economic and social context of the basins concerned probably makes this approach irrelevant, although in theory a levy could be applied to volumes of untreated water withdrawn in the basin for drinking water, to irrigated areas, or even to volumes withdrawn, (if a reliable metering system exists in farms).

(c) Polluter pays principle

Pollution can also incur payment of a fee. Used correctly, this tool can be an incentive to reduce pollution on the waterways concerned. The sums collected would not have a significant financial impact for public authorities, whether national or regional, since the money would mostly be used to combat the pollution in question. The levy/aid system can therefore provide a genuine economic incentive to pollute less.

It is crucial to consider this process gradually to ensure the necessary progress and adaptation without jeopardizing economic activity. The process should be established in participation with the various parties. When setting up a levy system, it is important to consider the following:

- The solvency of those liable and the role of the basin organization in identifying the main users (the issue of small users' solvency should be handled at country level);
- The type of contribution, since the basin organization cannot charge taxes but rather a levy, which is considered as the price to pay for the right to use a specific good or service.

(d) Ad hoc geographic scale

The choice of a levy-based funding system can be established separately at member state level or directly at the basin organization's regional level.

In the first case, we note that countries often apply the system in different ways. This means that the basin organization has a harmonization role to play between member states. Such a role is particularly relevant when it comes to fixing funding bases, rates and collection methods, in an attempt to strike an equal balance and avoid competitive distortion.

When contributions are collected (even partially) at regional level, the legal basis of the levy must be assured, possibly in a Water Charter (or equivalent regional text). A system based only on voluntary contributions from users and polluters is necessarily a lot more fragile and difficult to consolidate.

(e) Incentive and coercion

Concerning application of the polluter pays principle, the OECD recommends internalizing[10] external costs for each economic activity that generates pollution. In practice, this is only rarely applied: paying a pollution fee is generally more "economical" than removing pollution (investment and operating costs).

Thus, if applied on its own, this principle can take an unethical direction and turn into a "right to pollute". To avoid this, States and the basin organization should in parallel carry out their role of obliging polluters to treat their wastewater and respect standards: an efficient water police system, suitable coercive methods, and knowledge of entities likely to generate pollution (e.g. from industry, mines, oil production, homes, craft or farm production). Used together, these two tools of economic incentive and coercion act like carrot and stick and they have regularly proved their joint efficiency.

5.2.5 ***Remuneration for services***

The basin organization may receive payment for services it provides, such as:

- Assistance to project developers in the basin;
- Sales of raw data;
- Advice provided to public or private bodies or associations;
- Study services, hydrological modelling, information (mapping, analysis from databases).

These services usually generate low revenue in terms of meeting the operating costs requirements of a basin organization with a permanent secretariat.

10 The OECD adopted the polluter pays principle in 1972 as an economic principle whereby the "polluter should bear the expenses of carrying out measures decided by public authorities to ensure that the environment is in an acceptable state".

5.3 Overview of funding

5.3.1 *Recommendations*

As listed above, different funding systems can be set up for transboundary basin organizations. Each of these systems merits a specific study, adapted to the case of the basin concerned, with respect to the politico-economic context, the maturity of the organization and the confidence placed in it. Then ad hoc mechanisms to implement can be defined.

Funding from the basin					**Funding originating outside the basin**	
Contributions from member states		Fee-paying system	Remuneration for contracting carried out by the basin organization	Sale of services	Public-Private Partnership	Contribution from funding organizations (loans represent most of public development aid)
Direct contribution to the budget according to allocation criteria defining each country's share	Contribution through community taxes	Based on user/polluter pays principles	Payment for a contracting service provided by basin organization	Payment for a service or product supplied by the basin organization	Financing of infra structures by private sector as part of a contract	Based on projects (or perhaps programme approach)
No direct link with using the resource	No direct link with using the resource	Direct link to use	Linked to tasks performed by the basin organization	Linked to activities performed by the basin organization	Linked to infrastructures of the water sector	

5.3.2 *Management control and internal audit*

The recommendation is that basin organizations should set up a proper budget cycle that rigorously respects all stages, starting with selecting priorities through a "bottom-up" participative approach in line with needs and wishes. This process may be followed by a "top-down" decision that takes into account resources and actual possibilities, including evaluation processes and tighter subsequent controls, and lastly defining new targets in preparation for a new cycle.

Transparency is essential to make all instruments viable and long lasting. Contributing states and stakeholders are unlikely to observe properly rules decreed at regional/basin level if they are not convinced that other partners will "play the game" based on the same conditions in law and in fact. This may involve controlling the measure to ensure the regularity of operations for settling, covering and making revenue available.

The financial and accounting organization must therefore ensure the following:

- Auditors are named and replaced periodically by the basin organization's Council/Committee of Ministers. Their ex-post audits should be carried out independently. It would be a good idea to employ auditors that have no administrative or professional connections with either their order-givers or the basin organization, and that are remunerated in line with the general rules in use;

- A financial controller is also named by the Ministers. He should monitor legality and regularity in agreement with the executive manager of the basin organization, whichever is hierarchically superior;
- The nomination of the chief accountant is suggested by the director of the basin organization and he or she must imperatively be able to work in mutual understanding with the financial controller and the director of finance. Any source of tension should be avoided starting with the nomination: he or she comes directly under the director of finance but in practice answers to the financial controller.

5.3.3 *Financing projects and infrastructure*

Investments in the water sector are highly capitalistic. Creating major developments at river basin scale, inter-basin transfers, major water conveyance systems, treatment and purification facilities, and supply, drainage and wastewater collection systems : all require significant initial funding, which can only be realistically amortized over a very long period of several decades.

For this type of investment, all analyses show that the credit required by far exceeds the funding potential of national and territorial public budgets, as well as that of international public aid for development (APD). APD only represents around 10% of investments made in the world. Setting up finance systems that increasingly rely on the participation and solidarity of users is becoming a necessity everywhere. The scheme planned by OMVS for its port and navigation activities is innovative in this area (cf. chapter on governance).

In March 2006, WRCC published a "Guide to Funding – Water and Sanitation – Wastewater management – Integrated Water Resource Management – Irrigation (Centred on West Africa)", which sets out perspectives on the list of potentially available funding to finance (structuring or non-structuring, national or regional) projects , connected to the theme of IWRM or sectoral usage. Several documents have also been published regarding OECD's "3T" concept (i.e. tariffs, taxes and transfers) and public-private partnerships.

Annex – Bibliography

Code	Title	Contractor	Author	Date
GN1	Institutional and organizational audit of the Niger Basin Authority – final report	NBA	IOWater	Oct 2003
GN2	Shared vision of the Niger River basin	NBA	C. Brachet; R. Dessouassi	May 2008
GN3	Niger River Basin Water Charter	NBA		April 2008
GV1	STRATEGIC PLAN 2010-2014	VBA	VBA	Jan 2011
GV2	PREPARATION OF THE VOLTA RIVER BASIN WATER CHARTER	VBA	AHT Group	Dec 2009
GV3	Project for improving Water governance in the Volta Basin (PAGEV). Water audit of the Volta basin	IUCN	Nii Consult	August 2007
GO1	Revised Treaty – chapter VI Cooperation in environment and natural resources	ECOWAS		1993
GO2	35th ordinary session of the conference of Heads of State and Government on the adoption of a policy on water resources in West Africa	ECOWAS		Dec 2008
GO3	INTEGRATING GENDER IN WATER RESOURCES MANAGEMENT IN WEST AFRICA – ANALYSIS OF THE SITUATION AND DRAFT ACTION PROGRAMME	ECOWAS - WRCC		2006
GC1	AGREEMENT INSTITUTING A STANDARD RIVER REGIME AND CREATING CICOS	CICOS		2004
GC2	ADDITION TO THE AGREEMENT INSTITUTING A STANDARD RIVER REGIME AND CREATING CICOS	CICOS		2007
GC3	MANAGING WATER RESOURCES IN THE CONGO RIVER BASIN – End of mission report	CICOS	C. Brachet	2010
GS1	Study of the institutional reform of the OMVS system – final report	OMVS	OIE/CNR	Dec 2008
GS2	INSTITUTIONAL AND STRUCTURAL STUDY OF THE ORGANIZATION FOR THE DEVELOPMENT OF THE SENEGAL RIVER Final report	OMVS-Haut Commissariat	Promavi-Inc	Oct 2005
GA1	Water governance in OECD countries - a multilevel approach	OECD	OECD	Oct 2011
GA2	Towards the concerted management of transboundary aquifer systems – methodological guide		BRGM/OIE	Nov 2010
GA3	The role of regional and local authorities in promoting a sustainable water policy		EU-Committee of the regions	May 2001

Code	Title	Contractor	Author	Date
GA4	Proposition of a strategic guide to help set up international inter-state commissions on shared waters	Agence de l'eau Seine Normandie	Académie de l'eau	2002
MN1	Niger-HYCOS Project. Project document - AFD & FAE	NBA	NBA - WMO	July 2006
MN2	Basic study for the operationalization of the Niger Basin Observatory. Development Plan	NBA	SOFRECO / GEO-HYD	November 2010
MN3	Basic study for the operationalization of the Niger Basin Observatory. Definition of the Indicators	NBA	SOFRECO / GEO-HYD	November 2010
MN4	Establishment of a Computer Information System for forecasting the flows of the Niger river. Development of forecasting models	NBA	ISL	July 2010
MN5	Regional workshop for dialogue on the assessment of climate risk in the Niger river basin. Report	NBA	NBA	May 2010
MV1	Assessment of the hydro-meteorological situation in the Volta River basin. Assessment of the existing monitoring systems	VBA	SHER	January 2011
MV2	Project for improving Water governance in the Volta Basin (PAGEV). Water audit of the Volta basin	IUCN	Nii Consult	August 2007
MV3	Study on the establishment of a regional system for exchange of data and information on the Volta River basin	GEF-Volta	UNEP-GEF-UNOPS	December 2008
MO1	Regional Water Atlas of ECOWAS. Identification of data sources	WRCC	Emmanuel BALLOFFET	January 2007
MO2	Regional atlas of water resources in West Africa	WRCC	WRCC	2010
MC1	Congo-HYCOS. Preliminary project document	CICOS	WMO	April 2010
MS1	Technical Notes of the Observatory on the monitoring-assessment of the Status of the Environment in the Senegal River Basin	OMVS	OMVS	June 2005
MS2	Establishment of a health monitoring system in OMVS	OMVS	AEDES	July 2010
MS3	Handbook of procedures for health monitoring by OMVS – Version 1	OMVS	OMVS	March 2011
MA1	WHYCOS Directives	WMO	WMO	October 2005
MA2	9th WIAG meeting. Geneva, Switzerland. Draft Report	WMO	WMO	December 2011
MA3	Handbook for integrated water resources management in transboundary river basins, lakes and aquifers	INBO - GWP	Brachet et al	March 2012
PN1	Etablishment of a Management Model for the Niger Basin. Final Report	NBA	BRL - DHI	September 2007
PN2	Elaboration of an Action Plan for Sustainable development of the Niger Basin	NBA	BRL – DHV – CIRA –	July 2007

Code	Title	Contractor	Author	Date
			ISADES	
PN3	Study for an Investment Programme and formulation of investment projects required to implement the Shared Vision	NBA	BRL - DHV	December2007
PN4	Study on contracting projects and programmes in the Niger Basin	NBA	BRL	January 2010
PN5	Strategic Action Plan (SAP) for the River Niger Basin	NBA		October 2010
PV1	Project for improving Water governance in the Volta Basin (PAGEV). Water audit of the Volta basin	IUCN	Nii Consult	August 2007
PV2	Volta River Transboundary diagnostic analysis: national report (6 countries)	GEF-Volta	UNEP-GEF-VBA-UNOPS	December 2010
PV3	Concept note - Challenge Programme on Water and Food (CPWF) in the Volta Basin	CPWF		2010
PV4	Assessment of the socio-economic and environmental situation in the basin and analysis of problems and issues of sustainable water resources management	VBA	SHER - GRET	January 2012
PO1	IWRM Action Plan for West Africa (PAR-GIRE/AO)	ECOWAS		October 2003
PO2	Regional integration for growth and poverty reduction in West Africa: strategies and action plan	ECOWAS - WAEMU		December 2006
PO3	West Africa water resources policy	ECOWAS		October 2007
PO4	Summary of forecasting studies on water and uses in West Africa	WRCC	AgroParisTech	February 2008
PO5	Cooperation on major infrastructure projects in the water sector in the ECOWAS area	WRCC		August 2008
PO6	Regional programme to promote irrigation in West Africa	IWMI		September 2009
PC1	Elaboration of a Strategic Action Plan for Integrated Water Resources Management in the Congo Basin	CICOS	STUDI	August 2010
PC2	Strategic Action Plan for Water Resources Management in the Congo Basin. Priority Investment Programme 2011-2015	CICOS	CICOS	March 2011
PS1	Water resources master plan for the Senegal River	OMVS	CSE-CACG-SCP	December 2010
PS2	Popularization Guide	OMVS	BRL-Eau Vive	2010
PS3	For the sustainable development of the Senegal River. Water resources master plan for the Senegal River	OMVS	SCP	2012
PA1	Dams and development – a new framework for decision-making	World Commission on Dams		November 2000

Annex – Summary of the electronic forum on transboundary monitoring

General

The general recommendations are as follows:

- Monitoring, along with planning, is one of the **essential functions** of basin organization. The main emphasis should be on hydrologic monitoring ("manage what you know");

- The **institutional framework** for coordinating data management activities should be established and validated by the parties involved. The basin organization is the consensual framework for participation and cooperation between member states in order to manage resources efficiently;

- Information systems can be progressively developed **in stages**. A first version of the system can be put in place rapidly, even though initially it will only concern a limited number of parameters. The aim is to avoid over-restrictive bureaucracy and remain aware of the need to keep the system operational;

- The information system should be managed by **permanent, competent staff** working at the organization;

- Even when externally funded projects support the information system to start with (i.e. its creation and kick-off), a precise timetable is required to ensure its sustainability. This should be drawn up in coordination with all partners and ultimately **operate autonomously**. Only one information system should exist within the basin organization (and also in countries on a specific theme, e.g. hydrology), since individual projects cannot manage parallel, superfluous systems;

- To ensure long-term monitoring, a basin organization's internal funding should concern not only the staff who manage the information system, but also the collection and **operating costs** of the system itself and its equipment, which can be significant.

Data acquisition and management

The recommendations on data are as follows:

- Knowledge of data on current and future water **usage and consumption** is necessary, as well as on existing (and planned) major developments and facilities. For these developments, other data are essential, such as on ecosystems (green infrastructure), displaced populations, and health (water-borne diseases);

- The "added value" that the basin organization generates through integrating data supplied by countries into the information system must be clearly established and proven. This may in particular involve derived **applications** of data, such as aiding

decisions on major infrastructures (cf. chapter on planning), or flood warnings. This will facilitate **data provision** ("win-win" process), as well as countries' financial contributions to the system's operations (or even to the basin organization itself, cf. chapter on funding).

- The efficient operation of a transboundary basin organization's monitoring activities is closely linked to that of the **national structures** representing it, since they play a fundamental intermediary role with national data producers.
  Sharing data between countries should obviously be advantageous to national stakeholders themselves in order to motivate them in the long term. Basin organizations should be able to lead focal point teams by e.g. providing them with training opportunities and chances to present results at workshops, sharing tools developed at basin level (e.g. hydrological models), inviting national partners to visit concrete achievements, etc. This sharing should be devised as a two-way process: the basin organization shares what it has collected and analyzed, while the countries share their own information in real-time, including those on projects that impact water resources. Each party thus enjoys benefits (win-win) and recognition;

- Following on from initial informal exchanges with countries, bi- and multilateral interchange protocols should clearly set out **data exchange** procedures, their use by basin organizations, and derived products.
  The choice of parameters used in the transboundary information system should be made with riparian countries, given that definitions are frequently the subject of disagreement between countries (and sometimes even within the same country). Basin organizations can capitalize on methods and useful scientific and technical aspects, both national and local, and extend them to basin level within one of the thematic networks on their information systems;

- **Communication** tools can vary depending on the case. For example, bulletins may be sent out (daily, weekly or monthly, on the Internet or paper) to inform stakeholders, including inhabitants. The crucial factors are the level at which communication takes place (decentralization), the use of appropriate terms (avoiding technical jargon), the instructive approach, and the language (including vernacular language).

Practices specific to HYCOS projects

The following points relate to projects on the WHYCOS programme:

- WMO resolutions 40 (CG-XII) and 25 (CG-XIII) propose rules for **exchanging data** and products (applications) relating to water between countries;

- **Automatic transmission** of data in "real time" can be successfully carried out by GSM telephone network (when coverage exists, which is often the case), cheaper than satellite transmission;

- Care should be taken in ensuring **familiarization** of data acquisition equipment, which belongs to countries;

• Monitoring should start by looking at the **quantitative aspects** of water resources, and then their qualitative aspects. For sedimentology, collaboration with scientific partners is essential;

• The process of producing and validating data in a **hydrological information system** comprises five steps (according to WMO): data acquisition (historic, measurements) - processing and validation of data on water levels – development of a calibration curve – calculation of flow and validation, including metadata (gauging, etc.) – quality control. Data should be managed using specific software for these various stages. When developing or choosing a system, working with hydrological experts and computer analysts is highly recommended;

• Basin organizations' monitoring of surface waters should quickly be extended to **aquifer systems**, which are often less well known. When they exist, collaboration with the organizations responsible for their management (Sahara and Sahel Observatory) is indispensible;

• **Rainfall monitoring** requires a broader, more representative network (i.e. entire catchment area) than for hydrometric stations (which are limited to waterway networks).

Derived tools

The following points relate to applications:

• Developing **models** to forecast extreme events (e.g. floods, droughts) or for simulation (allocation, forecast), often requires significant efforts to review settings data. To constantly improve their performance, these tools should be regularly updated to reflect the basin's hydrological situation;

• In addition to the basin organization's internal capacities, additional highly specialized skills may occasionally be taken on in the fields of metrology, data processing, databases and information systems, involving specific **technical expertise**, training, or software development. A service providing contract and "customized" technical assistance may be considered;

• **Satellite images** may be very useful, especially for checking data with little information or measurements;

• Working with specific **research** sectors is advisable, e.g. on climate change.

Climate change

It is essential to monitor the impacts of climate change on water resources. Monitoring can be used to establish different adaptation strategies to climate change depending on the flow regime of watercourses or aquifers:

• Adaptation depends on knowing about and anticipating phenomena. This entails the use of basin **models**, (which are scaled-down global models produced by the Intergovernmental

Panel on climate Change (IPCC)) although their high level of uncertainty still needs to be mastered;

• Connections between **water, energy and food security** are crucial (e.g. via large hydraulic infrastructures), along with connections between water and forests;

• Transboundary basin organizations help **raise awareness** among decision-makers of the impacts of climate change on water resources and hence the need for monitoring.

Conclusion

The role of transboundary organizations is to collect (via countries), analyze, and then summarize often complex data with the aim of making collective decisions that may be immediate (e.g. flood warnings, pollution), mid-term (abstraction authorizations), or long term (creation of new major hydraulic infrastructures). As a result, basin organizations should be able to analyze data, check their reliability, use them to describe the basin's situation and developments as precisely as possible, and then redistribute this information to member States.

Transboundary basin organizations thus act as an information exchange platform between countries in the basin, ideally with an information point for civil society. When the data collected is used efficiently, it can serve in investment choices, the management of hydraulic structures, resources' allocation, prevention of floods and droughts, and adaption to climate change. The quality and performance of this kind of tool depends on the reliability of the database. Individual member States are responsible for making the best use of information provided by these tools to implement adequate action. Thanks to internal skills, basin organizations can thus present themselves as a genuine "skills centre" available to countries, users and anyone who needs them.

However, inadequate sharing of data is often a real problem. Although transboundary basin organizations should play a role in centralizing data, data-collecting countries often face genuine issues of internal funding and data collection resources. The main solution to this problem is to make it easier to share data. This involves putting particular emphasis on developing data, and making decision-makers aware of the need for funding data collection.

Annex – Basin facts

Organization key facts

River: Niger

Surface area of river basin: 2,100,000 km^2 (active 1,500,000 km^2)

Length: 4,200 km

Population: 130 million (2012)

Basin countries: Algeria, Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Guinea, Mali, Niger, Nigeria and Chad. Algeria is not yet a formal member of NBA. It obtained observer status in 2006 and has participated in numerous technical or statutory NBA events since, without voting rights when appropriate.

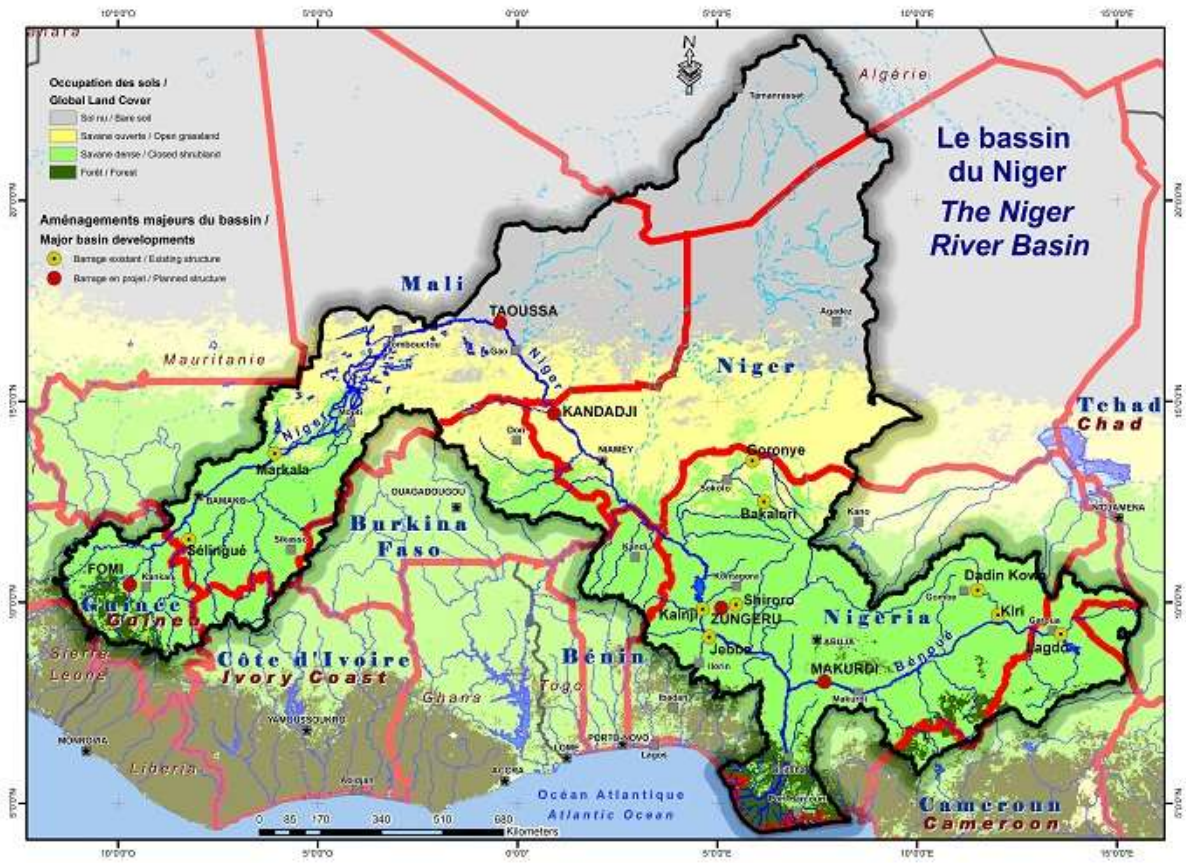
Name of structure: **Niger Basin Authority** (NBA)

Type of structure:
☑ Basin organization ☐ Other

Date of creation: 1980 (1964 under the name Niger River Commission)

Member countries: Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Guinea, Mali, Niger, Nigeria and Chad

Main IWRM tools:
Sustainable Development Action Plan (2008)
Investment Programme (2008)
Ratification of a Water Charter for the basin (2008)



Organization key facts

River: Volta

Surface area of river basin: 400,000 km^2

Length: 1,850 km

Population: 18 million (2000)

Basin countries: Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo

Name of structure: **Volta Basin Authority** (VBA)

Type of structure:
☑ Basin organization ☐ Other

Date of creation: 2006

Member countries: Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo

Main IWRM tools:
Convention in force since August 2009
Definition of Strategic Objectives 2010-2014 (2010)

Organization key facts

Main basins: Gambia, Mano, Mono, Niger, Senegal, Volta

Surface area: 5 million km²

Length: -

Population: 230 million

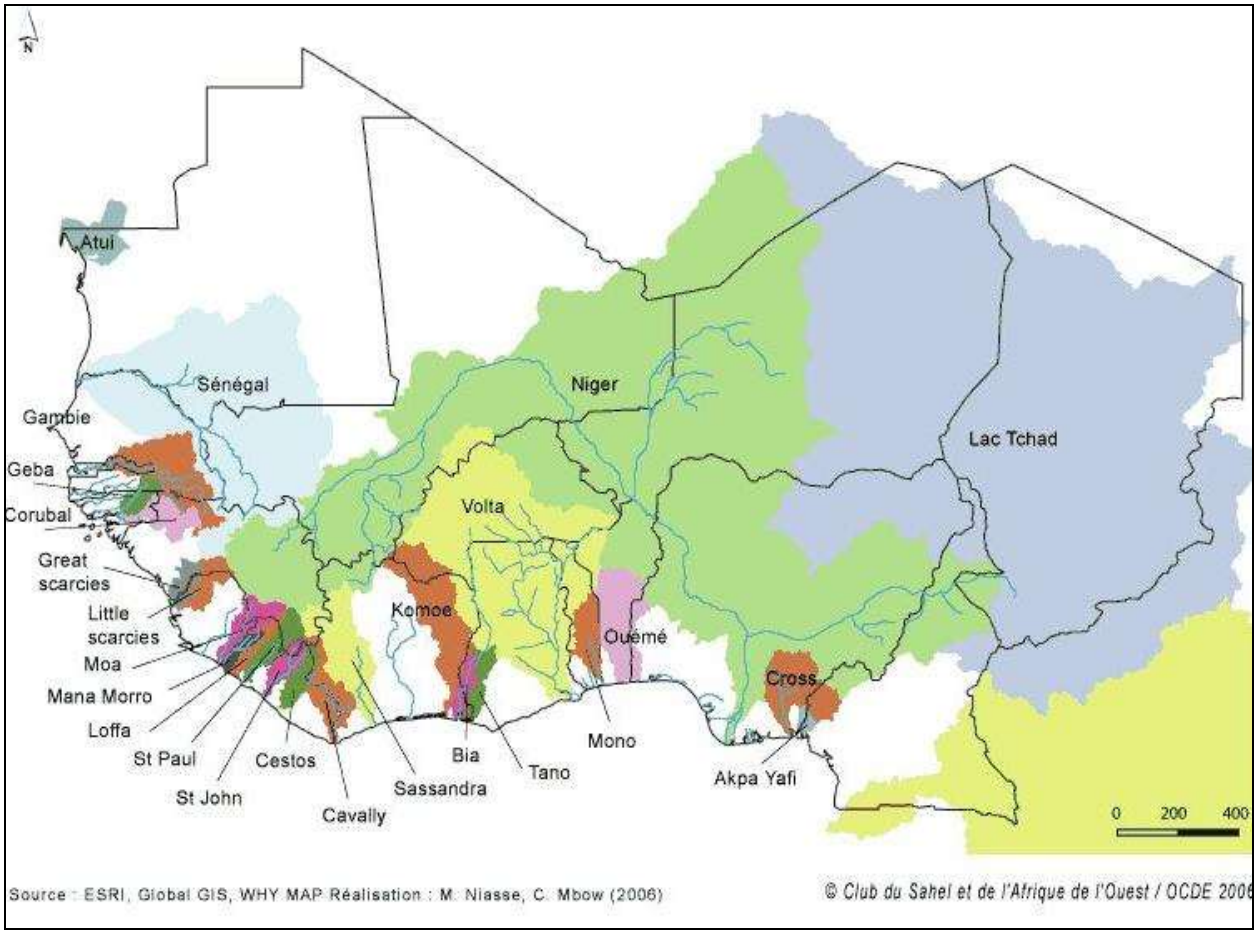
Member countries: Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo

Name of structure: **Economic Community of West African States (ECOWAS)**

Type of structure:
☐ Basin organization ☑ Other: intergovernmental organization

Date of creation: 1975

Main IWRM tools:
Water Resources Coordination Centre (WRCC) (2004)
IWRM Action Plan for West Africa (2003)



Organization key facts

River: Congo

Surface area of river basin: 3,800,000 km²

Length: 4,700 km

Population: about 90 million

Basin countries: Angola, Burundi, Cameroon, Central African Republic, Congo, Gabon, Democratic Republic of the Congo, Rwanda, Tanzania, Zambia

Name of structure: **International Commission of the Congo-Ubangui-Sangha Basin (CICOS)**

Type of structure:
☑ Basin organization ☐ Other

Date of creation: 1999, Activities initiated in 2003
Member countries: Cameroon, Central African Republic, Congo, Gabon and Democratic Republic of the Congo

Main IWRM tools:
Strategic Action Plan (2010)

Organization key facts

River: Senegal

Surface area of river basin: 300,000 km²

Length: 1,800 km

Population: 3.5 million

Basin countries: Guinea, Mali, Mauritania, Senegal

Name of structure: **Organization for the Development of the Senegal River (OMVS)**

Type of structure:
☑ Basin organization ☐ Other

Date of creation: 1972
Member countries: Guinea, Mali, Mauritania, Senegal

Main IWRM tools:
Environment Observatory (2000)
Senegal River Water Charter (2002)
Strategic Action Plan
Water Development and Management Master Plan (2011)